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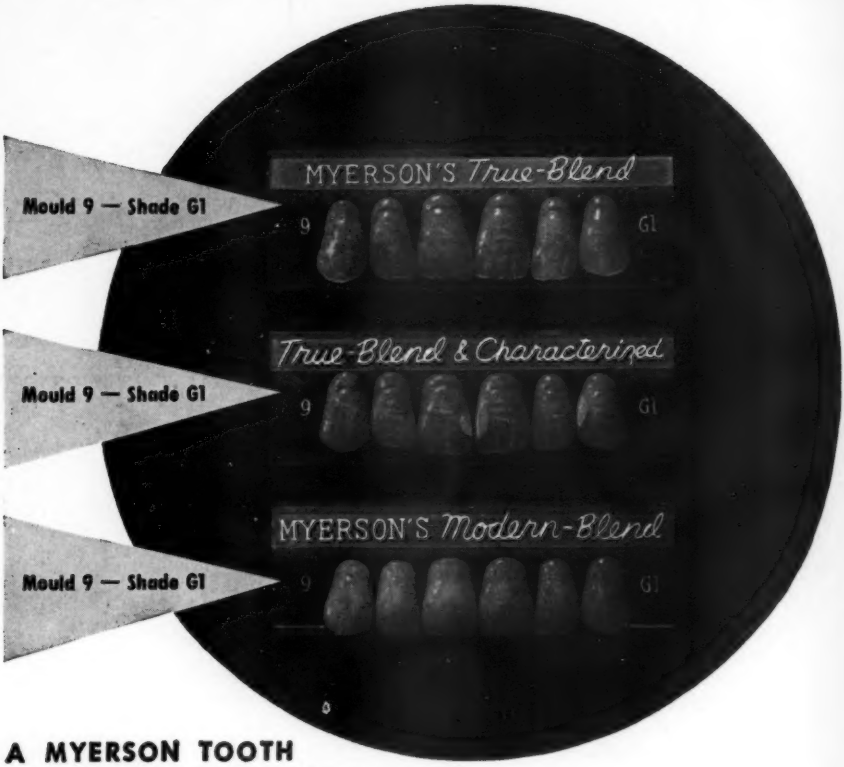

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RESTORATIONS WITH AMALGAM IN THE ARMY: AN EVALUATION AND ANALYSIS

Leo H. Roper,* D.D.S., New York

From December 7, 1941 to September 1, 1945, 68,170,326[1] permanent fillings were inserted by Army dentists. The bulk of these fillings were of amalgam. At no other time in the history of dentistry has amalgam been subjected to a test on so stupendous a scale.

Army experience revealed that there are certain flaws in restorations with amalgam which occur with regular frequency. These flaws are caused by faulty procedures which can be eliminated easily by any one interested in better amalgam fillings. This was proved by many men in the Army.

In civilian practice a dentist sees the work of relatively few colleagues. According to Army regulations, in large station hospitals to which I was assigned, the completed work on each patient was examined either by an examining officer as such or by the dentist's co-worker. Working in close collaboration and proximity, Army dentists had a unique opportunity to check and evaluate each other's work. In the capacity of both examining officer and co-worker, I saw thousands of patients who had had work done by dentists from almost every dental school in the United States.

Intensive work with amalgam fillings plus the advantage of constant observation and frequent discussion could not fail to contribute to the improvement of the individual dentist's technic. In fact, interested dentists eliminated most of their faulty procedures and, in a remarkably short time, were turning out restorations superior enough to satisfy the most critical examination (Fig. 1†).

The flaws in technic which were eliminated in army practice by these men were brought with them from civilian practice. The difficulties which they experienced in their own offices showed up inevitably in army practice. Selected from all sections of the country for the Army, these men were average ethical competent dentists with no special training and no special interest in technics. They were equipped with no special instruments. What they did to improve and perfect

*Formerly Captain (DC) AUS.

1. Figures supplied by The Surgeon General.

†All photographs were taken by Photo Section, Army Air Corps Proving Ground Command, Eglin Field, Fla.

their procedures can be done by any dentist who is interested in bettering his technic in the use of amalgam.

The purpose of this article is not to propound any new, complicated or fancy technic but rather to list the dominant

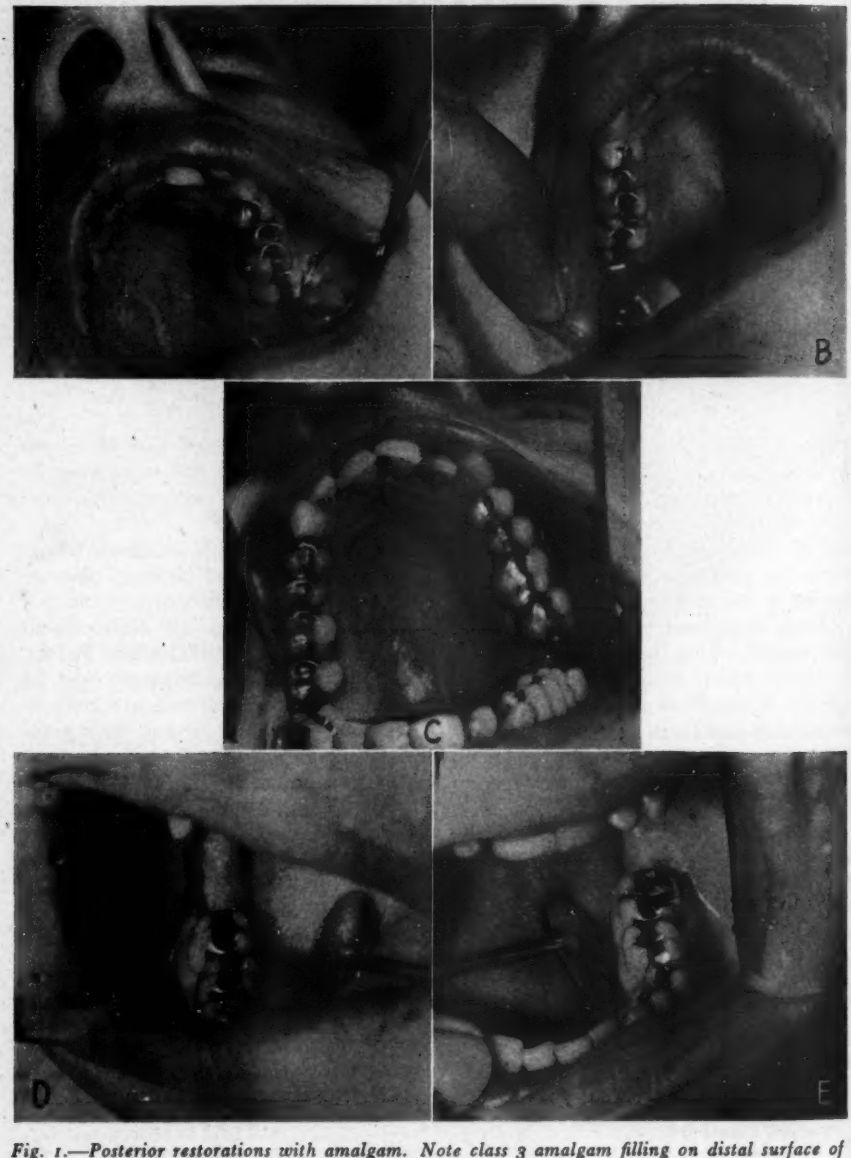

Fig. 1.—Posterior restorations with amalgam. Note class 3 amalgam filling on distal surface of upper right cuspid in C

flaws that show up in amalgam fillings and to describe how the average dentist in the Army succeeded in eliminating them.

Army practice proved that silver alloy properly handled is as effective for a restoration as any other filling material to be had today. Inserted with proper care, it has no superior. It is high time to discard the notion that amalgam is a substitute for gold inlay.

Preparation of Cavity

As is the case in any operative procedure, the most important step is the first, preparation of the cavity.

Class 1.—Simple Occlusal Surfaces.—If all the causes for all the faulty restorations with amalgam ever made were considered carefully, there would be no question that the most common would be this: insufficient removal of tooth structure. A dentist often has honest respect for the tissues involved. However commendable this attitude may be, the logic is questionable. A tooth which is carious is diseased and will definitely be lost unless it is cut and filled. Removing enough of the tooth structure insures a restoration which will protect the tooth against future decay.

A cavity can be handled best only if it is opened sufficiently. The cardinal requirement must be easy access. Since decay spreads in the dentin, complete eradication is assured only in a wide, open cavity. To attempt excavation under overhanging cusps is a dangerous procedure, and the results are often unsatisfactory. Decay has a tendency to hide in corners and crevices. Such decay can be disclosed by the flooding of such a cavity with a fresh aqueous solution of silver nitrate after the toilet is considered complete. By turning dark, the hidden decay will show up visibly under the overhanging cusps. Clean dentin or enamel will not be so colored. Secondary dentin may turn yellow but never dark brown or black. Too often one sees deep fillings placed through a minute opening in the enamel. The result is inevitably a tooth darkened by secondary decay, involving the entire crown and often the pulp itself. Only when the cavity can be thoroughly inspected can one be sure that the toilet is complete.

In a confined cavity there are the additional problems of placing a cement base properly and condensing the amalgam itself. There is also the subsequent problem of carving and finishing the restoration. The changes attributed to amalgam after setting often are not caused by physical or chemical alterations but stem from a faulty preparation.

All dentists have seen fillings scarcely wider than the width of a No. 558 bur. For lack of a plugger point so small, the amalgam is insufficiently condensed. The result is, of course, a weak pitted filling, which soon becomes leaky. Since these narrow fillings often end in fissures, feather edges are unavoidable. Later these extensions break off and carry away some of the amalgam inside the margins as well. The result, a so-called ditched filling, is too often attributed to contraction of the alloy.

In the filling of class 1 cavities, therefore, the most frequent mistake is failure to provide sufficient access. Black's precepts still must be kept in mind. Walls should be parallel and widened to insure complete visibility.

Class 2.—Proximal Surface of Bicuspids and Molars.—Again the dentist's reluctance to remove tooth structure was responsible for failure oftener than any other cause. As yet no successful substitute or short cut has been found for Black's fundamental of extension for prevention. The proximal margin must be brought well out into the embrasures. This precept is so fundamental it need not be mentioned. Nevertheless, in an attempt to conserve tooth structure or time, this fundamental was too frequently ignored.

The results were not only secondary decay along the margins which could not be kept clean but often decay in the adjacent tooth as well.

Another source of trouble frequently encountered in these proximo-occlusal amalgam fillings was the lack of sufficient retention, especially in the isthmus. In those cases in which the approximating tooth is missing, retention in the proximal part of the cavity is necessary also. If support and protection during mastication have been lost through the absence of an adjacent tooth, self retention is essential in each part of the preparation. Restorations which lack such retention often shear off at the isthmus and lose the proximal portion of the filling.

Sufficient retention will also obviate the necessity for allowing the amalgam to set partially before removing the matrix for fear of breaking off the filling. There need be no such fear if the preparation has been given enough retention. In fact it is preferable to remove the band immediately.

There still exists some confusion as to where the proximogingival floor is to end. The insistence on ending the step under the gingival crest often results in unsatisfactory restorations especially when gingival recession has taken place. Extending the proximal floor under the gingiva often places the step in cementum. The dentist is now faced with the necessity of rebuilding that portion of the proximal floor which is usually concave, a difficult and hazardous procedure, often resulting in overhanging incomplete margins and secondary decay. The proximogingival margin should be extended below the contact point, but it need not extend below or even up to the gingival margin.

Finally when all precepts of good cavity preparation have been followed, the sharp, knifelike edges of the preparation must be planed down, not beveled, but the bur must be removed. This can be accomplished with either sharp chisels or cuttlefish disks. When this has been neglected, the finished amalgam filling will fail to hug these knifelike edges and leave them exposed.

Class 3 and Class 4.—Proximal Surfaces of Anterior Teeth and Proximal Surfaces of Anterior Teeth Including the Incisal Tips.—Until recently cavities of these classes were filled with either gold or synthetic porcelain. However, synthetic porcelain at best is none too durable a material for fillings, and gold presents its own problems. In the Army and in civilian practice amalgam has been used successfully on the distal surfaces of the cuspids and even on the lateral incisors. With regard to cavities of class 3, access is gained by an opening into the linguodistal surface sufficiently for a matrix to be placed and held by a wooden wedge or matrix retainer. The top of the band must be cut away at the lingual surface to gain access and visibility if a retainer is used.

For cavities of class 4, involving the cuspid, a sound, lasting and beautiful restoration is possible with amalgam. The objection has been raised that amalgam in these cavities has a tendency to discolor the tooth. Silver salts are supposed to form and to penetrate the dentinal tubules. However, if the margins are not left too thin and care is taken when the cement base is inserted, a well condensed alloy, properly finished and polished, makes a restoration in no way unesthetic and one which will not discolor an anterior tooth any more than it will a posterior tooth. For persons still fearful of possible discoloration, lining the cavity with varnish will obviate any penetration of amalgam salts into the dentinal tubules.

Of course, a sound cavity preparation is necessary for this type of cavity as well as for all other types of cavities. In addition a matrix held firmly in place by a retainer is also essential. It often requires some ingenuity and manipulation in

order to insure a well condensed alloy. The entire band and retainer may have to be reversed, that is, used on the lingual surface instead of on the facial surface. I have seen such fillings look as good as any inlay, since the distal aspect of the cuspid does not show. In addition all the margins are sealed hermetically not with cement but with metal.

Class 5.—Gingival Third Surfaces.—In this class, as in classes 3 and 4, esthetic considerations are important, and the use of the alloy is limited to the part of the tooth above the high lip line. If the body of the cavity is above this line, the silver alloy is the filling material of choice. The ease with which it can be inserted, the fact that it will not discolor or wash out and its ability to seal the margins hermetically make amalgam the material of first choice for these simple but troublesome cavities. Failure with these comparatively simple fillings was due to the same practices which resulted in faulty restorations in classes 1 and 2. Because the cavity was not opened to the necessary extent all the decay was not removed; the cement lining was not adequately placed, nor were the margins completely condensed and finished (Fig. 2).

The first requirement, therefore, for a successful restoration with amalgam is a properly prepared cavity. With the cavity so prepared and all decay removed, the greatest source of trouble has been eliminated. However, there are a few remaining hazards which make for poor subsequent restorations.

Cavity Lining

Some doubt has been voiced as to the necessity for a cement base in reducing thermal shock. It is true that irritation may not be caused solely by thermal changes. The results of actual experience in the Army, examining thousands of mouths, would indicate that some cavity lining is necessary. I am inclined to

Fig. 2.—Class 5 amalgam fillings. Lower restorations were incompletely filled and condensed. Pitted appearance also shows improper finishing. Upper right cuspid has a successful restoration of this type

believe that as a seal for the open sensitive dentinal tubules a lining is important. Freshly cut dentin becomes irritated because it is susceptible to compression. All dentists have observed this characteristic. A cavity which has been sealed with gutta-percha will be more sensitive than it was immediately after preparation. It cannot be the thermal conductivity or chemical reaction of the gutta-percha that sets up this irritation. It must be the compression of the gutta-percha against the open tubules during mastication. This reaction does not take place when the dentin has been covered with a cement base or when the open ends of the tubules have been seared with silver nitrate or even covered with cavity varnish.

These freshly cut tubules in a deep cavity usually react unfavorably when amalgam is packed directly on the newly cut open nerve ends. This reaction was intensified in flying personnel, especially at high altitudes where all physical reactions are increased. Many well placed amalgam fillings had to be removed because of irritation to the dentin, not only because the cement lining had not been placed but even because the cement did not completely cover the sensitive dentin. The dentin had become so irritated that complete rest for a few days was necessary before a new filling could be placed. Zinc oxide and eugenol in a stiff mix was used. When all sensitivity was gone, a well lined cement base, keeping the pressure from

the open tubules while the amalgam was being condensed, eliminated future trouble. Persons with such fillings had no discomfort even in the pressure chamber which simulated all the changes of atmospheric pressures.

In young patients, because the pulpal chamber is still large and the horns of the pulp are relatively high in the crown, even a shallow cavity will give trouble if the tubules are not sealed. In those cavities for which cement bases are not possible, cavity varnish or silver nitrate will avoid future trouble.

Now, the cavity well prepared and thoroughly lined is ready for the amalgam itself.

Trituration

Instructions for trituration given in textbooks and by the manufacturer are complete. If these instructions are followed carefully, there will be no difficulty resulting from improperly mixed alloy.

Trituration must be thorough. The rougher the filings, the more time is necessary to secure a smooth amalgam. Early in World War II the Army dental supply depots had alloy of varying makes and fineness of filing. For a time there was an alloy of so rough a grit that every one had difficulty in securing a smooth amalgam. After considerable experimentation it was learned that trituration was complete only after three full minutes.

A report from the Indiana University, School of Dentistry,[2] tends to show that overtrituration (three minutes) will result in a stronger better filling with no demonstrable clinical disadvantages evident after a two year period of observation.

The amalgam must not be contaminated in any way. This includes the procedure of handling, or of mulling in the palm. Kornfeld[3] pointed out that no one has yet given a good reason for mulling. The mix should be rotated in a napkin but never handled. Of course contamination also refers to saliva. Amalgam plugged in a wet field can never be finished off properly, nor can it protect a cavity completely.

Packing and Condensing

Once the amalgam has been mixed, the cavity should be packed as quickly as possible. All the excess mercury should be brought to the surface and the cavity overfilled. This excess should be carved away before the mercury is reabsorbed by the body of the filling. Whether to use hand pressure or an automatic mallet in plugging and condensing is left to the choice of the dentist. Good results can be obtained with either method.

For cavities of class 2, the circumferential bands are preferable to the so-called halfbands. The complete band can be more securely fixed and held in place while the amalgam is condensed.

The interproximal wedge cannot be eliminated without deleterious results. It is absolutely necessary for good gingival margins. On the market there is a new matrix retainer and band which has a two dimensional grip. But even with this new appliance a wedge is necessary in more cases than not. The wedge is also an aid in controlling hemorrhage in those troublesome cavities which extend below a gingiva which is congested and bleeds easily. A well placed band and a tight wedge will keep the bleeding under control and insure a dry sterile cavity.

A cavity having a large part of the proximal walls destroyed proved troublesome to many. A tightly held band did not permit sufficient amalgam to be packed into the proximal portion of the cavity to restore normal contour. Such a filling presented a flattened buccoproximal or linguoproximal surface. The natural aftermath was a food pocket. This difficulty was overcome by the band being

2. Phillips, R. W.; Boyd, D. A.; Healey, H. J., and Crawford, W. H.: Clinical Observations on Amalgam with Known Physical Properties, Final Report. *J.A.D.A.* 32:325 (March 1) 1945.

3. Kornfeld, Benjamin: Successful Amalgam Restorations. *J. D. Soc. (N.Y.)*, 11:59 (March-April) 1945.

slightly opened after the gingival portion of the proximal surface had been packed. The band is let out as the proximal portion is plugged. This insures sufficient bulk for natural contour. After the band has been removed, the excess can be carved away.

Carving and Polishing

Two steps, carving and polishing, have been the most neglected in all restorations with amalgam, and this neglect is responsible for the ugly-looking black fillings seen so often. No one would neglect to carve and polish a gold inlay before cementation. Too many men, however, are satisfied with a few strokes of a ball burnisher on an amalgam filling.

If any one has had a large restoration with amalgam made recently, he will recall how strange it felt to the tongue. He will also recall what a world of difference carving and polishing made. If the patient has many fillings, it becomes obvious how much added comfort this service can afford. The difference in appearance is so great that the time spent is well worth the effort.

These are a few points for one to bear in mind in finishing amalgam.

Once condensing is complete, carving must be started immediately so that the mercury-laden excess can be removed. The remaining amalgam, if properly and thoroughly condensed, should be firm enough to carve with sharp chisels. The amalgam should be cut decisively and not burnished with dull carvers or smooth instruments. All excess must be removed. Leaving feather edges to break off later will result in ditched fillings.

Carving should not be arbitrary. The inclined planes of the remaining cusps should guide the chisel. This not only will restore proper contour but will avoid high spots.

The ideal marble-like contact point does not always exist in the mouth. Often the normal one is much wider, sometimes flat. In such a case, the amalgam must be contoured accordingly.

The restoration of the marginal ridge often caused trouble because this important structure was rebuilt too high and too close to the adjacent tooth. This caused too wide a contact point, left no embrasure and resulted in retention of food. The marginal ridge usually failed to withstand the undue stress in mastication and chipped off. Running an explorer or a linen strip between the teeth above the contact point will round off the ridge and leave a proper embrasure. An examination of the natural anatomy of the tooth will demonstrate graphically how this part of the anatomy must be restored.

As soon as the occlusal carving has been completed, the band should be removed and the proximal and gingival margins trimmed. One must exercise care in removing the excess from the gingival margins. If the band and the wedge are secure, this excess will be slight but there will be some excess. (Routine postoperative bitewing roentgenograms will disillusion any one who feels that amalgam can be kept from being squeezed past the band at all times.) Sharp instruments may undercarve this margin. A slightly rolled margin is preferable. This can be best accomplished with a No. 23 explorer. During a later visit, with a linen strip the roll can be reduced to a minimum.

In checking occlusion for high spots one word of warning may be in order. Often the opposing tooth has a sharp elongated cusp due to either a slight extrusion into a cavity of long standing or a lack of natural attrition. Rather than destroy the shape of the new amalgam and create a valley for plunger action of cusps, one should trim down the offending cusp, a good practice causing no harm. It is preferable to do this rather than to struggle to free such a cusp from occlusion by cutting away more and more amalgam. The results from the latter

Fig. 3.—Teeth and gums after assiduous interdental massage and stimulation. Interproximal spaces are clean; gingival crests are pushed down to eliminate pyorrhea pockets, and tone of tissue is good

procedure will be a weakened filling, lost time and frayed nerves.

The carving is complete after all scratches and pits are removed. The final polishing should be done not sooner than forty-eight hours after the insertion of the filling. If the work has been done properly up to this point, a smooth disk, strip, pumice on a wet brush and finally tin oxide in a paste will leave a mirror-like finish. The restoration will not turn black or lose its luster. It will look as good as any casting and perform its functions as well as, if not better than, an inlay.

Instructions to the Patient

As the final step of restoration with amalgam, as in every phase of dental procedure, the patient should be instructed in subsequent personal care. No restorative work can be expected to last for a long time unless the patient does his part in caring for his mouth. If the dense microscopically smooth enamel breaks down and becomes decayed, what chance have even the best efforts of the dentist?

Instruction should include, in addition to the necessity of periodic examinations and prophylactic treatments, a definite method of brushing the teeth. The dentist must select whichever method is most successful in keeping the mouth clean and the gums healthy. However, the patient must be shown how to use the correct brush properly and not just told.

In addition some form of interdental stimulation should be recommended. There are many appliances on the market, and here again the dentist must recommend whichever ones will keep the embrasures free from film and the margins of the fillings clean and polished. To expect the natural function of the gingiva to do this is futile. There are too few mouths in which the gingival crest is at its normal height and the tone sufficiently good for such protection. Artificial stimulation and prophylactic measures by the adult patient are generally necessary (Fig. 3).

Summary and Conclusions

The huge amount of work done with amalgam in the Army during World War II and the opportunity many men had of improving their technic provide an excellent opportunity for reevaluation of the silver alloy as a filling material.

The same recurring flaws seen in amalgam fillings tend to show that more care and consideration are necessary.

That most of these flaws were eliminated by many men in the Army proves that any one interested can turn out more successful amalgam fillings with little extra time and effort.

When considered as the material of choice and used with good judgment, amalgam performs all the required functions and fulfills all the esthetic requirements of a filling as well as, if not better than, any other material at hand.

As a restorative for carious teeth amalgam has proved its superb qualities and stands at the head of the list, holding its own with the heretofore more glamorous gold inlay.—*724 Fifth Avenue.*

IMPORTANCE OF THE MERCURY-ALLOY RATIO TO THE AMALGAM FILLING

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It is common knowledge that, of all the restorative materials employed in dentistry, amalgam is not only the most widely used but also the most susceptible to the human variables. Amalgam is extremely sensitive to manipulative abuse; in fact, it is more difficult, day in and day out, to produce uniformly good fillings with amalgam than with any of the other materials used by the dentist for restorative purposes. Everything that is done during the manipulation, as well as the packing and finishing of the alloy, has a very definite effect upon the physical properties and, thus, the resulting success or failure of the restoration. Research has so perfected the manufacture of amalgam that today there are very few definitely inferior alloys on the market. Therefore, the great majority of the unsuccessful amalgam restorations, seen daily, other than those resulting from improper cavity preparation, must not be attributed to the use of a poor alloy but to the improper use of a good alloy. Even with the best alloys available, an exacting technic must be employed to assure a successful restoration. Amalgam is dependent for its success upon intelligent use.

Standardizing the Technic

Much work has been done to standardize the technic required in the successful handling of amalgam. For many years, investigations have endeavored to reduce the variables that are involved in manipulation. We are fully aware of the fact that, even when the most exacting of technics is employed and the manufacturer's directions are followed explicitly, the human element is so great that a wide variation in physical properties may result. It is known, for example, that an underamalgamated alloy will produce a weak, rough filling. We also know that improper condensation will produce weakness and high flow. It can be demonstrated easily that mulling the material in the perspiring palm or permitting it to be contaminated by saliva during packing will produce a delayed expansion of 300 to 400 microns per centimeter with possibly serious results. The effects of this contamination are seen in bubbles on the surface of the restoration or its actual protrusion from the cavity.[1, 2] There are many other examples that might be cited of how the variables in amalgam manipulation will alter the physical properties and the success of the filling.[3, 4, 5] Since the clinical manifestations of slightly inferior properties are so vividly evident in daily practice, it behooves the dentist to reduce to the absolute minimum all of these variables which are under his control. Each variable that can be controlled increases the assurances of a successful restoration,

*Assistant Professor of Dental Materials, Indiana University, School of Dentistry, Indianapolis.
†Associate Professor of Operative Dentistry.

1. Schoonover, E. C.; Souder, Wilmer, and Beall, J.R., Excessive Expansion of Dental Amalgam. *J.A.D.A.* 29:1825 (October 1) 1942.
2. Phillips, R. W., et al., Clinical Observations on Amalgam with Known Physical Properties. *J. D. Res.* 22:167 (June) 1943.
3. Kilpatrick, H. C., Elimination of Variables in Amalgam Manipulation. *D. Digest* 49:76 (February) 1943.
4. Romnes, A. F., Clinical Aspects of Amalgam Restorations. *J.A.D.A.* 28:54 (January) 1941.
5. Sweeney, J. T., Uncontrolled Variables in Amalgam, with Significant Improvements in Making of Restorations. *J.A.D.A.* 27:190 (February) 1940.

and good amalgam fillings can be attained consistently only by means of a standardized manipulative technic.

Control of the Variables

Among others, one of the variables which is under the control of the dentist is the proper proportioning of the mercury and alloy. There are many things that are involved in the manufacture and in the manipulation of amalgam which are beyond the control of the dentist but this is one of the factors that he can control definitely. Are the physical properties of a restoration seriously altered if the mercury and alloy are not accurately weighed? The purpose of this investigation was to determine the importance of strict adherence to the mercury-alloy ratio which is specified by each manufacturer.

Ward,[6] Gayler,[7] Taylor[8] and others have fairly well established the fact that, when excess mercury is allowed to remain in amalgam after condensation, the strength is impaired (force required to crush the specimen is lowered and flow is increased). Clinical results have also indicated that tarnish and corrosion occur more readily on restorations containing an excess of mercury after packing.[9, 10] These findings have led to the advocation of a good condensation technic, heavy packing pressure and a small condenser point being used to expel all the mercury possible and thus assure maximum strength and resistance to tarnish.

For the same reason, to reduce the percentage of residual mercury remaining after packing, strict adherence to the mercury-alloy ratio which is specified by the manufacturer has long been advocated. However, no one has as yet shown evidence that a slight variation from this ratio will definitely alter the percentage of residual mercury or the resulting physical properties of the restoration. At the present time, many dentists do not use a balance of any kind to measure the alloy and mercury. They rely entirely upon experience in judging the correct ratio. Although it is generally known, as I have pointed out, that a high percentage of mercury left in the restoration will weaken it, the argument is advanced that, if a heavy pressure is used during condensation, any excess mercury that was used in the original mix will then be removed. If that is true, then any slight variation in the recommended ratio would not have any great effect on the final properties or the success of the restoration. On the other hand, it might be equally true that, if an excess of mercury is used in the mix, a higher percentage of mercury is retained in the restoration, regardless of the method of packing or the amount of pressure used in condensation. This could then produce not only a weaker filling but also one more susceptible to tarnish.

The purpose of this study, therefore, was to determine the actual percentage of mercury remaining in the restoration after condensation when different mercury-alloy ratios were employed. This ratio was the only variable, all other factors involved in manipulation being held constant. These data were then to be correlated with the resulting physical properties obtained with the different ratios.

Materials Used

Since the composition and grain size of all alloys vary somewhat, a total of six popular commercial alloys was used in each series of tests. Results obtained on one alloy alone do not permit one

6. Ward, M. L., and Scott, E. A., Effects of Variation in Manipulation on Dimensional Change, Crushing Strength and Flow of Amalgam. *J.A.D.A.* 19:1683 (October) 1932.

7. Gayler, Marie L. V., The Setting of Dental Amalgams. *Brit. D. J.* 56:11 (June) 1936.

8. Taylor, N. O., Amalgam Technic: Dependable and Dangerous Practices. *J.A.D.A.* 17:1880 (October) 1930.

9. Souder, Wilmer, and Paffenbarger, George, *Physical Properties of Dental Materials.* (National Bureau of Standards, C433) Washington: U.S. Government Printing Office, 1942.

10. Sweeney, J. T., An Improved Technic for Packing and Condensing Uniform Amalgam Restorations by Hand. *J.A.D.A.* 28:1463 (September) 1941.

to deduce that all others will behave similarly. Testing six different alloys allows any general trends to be observed. Three were small-grained and three were large-grained alloys. The three different mercury-alloy ratios which were employed for each alloy were: (1) fifteen per cent less mercury than the manufacturer directed, (2) exact ratio as recommended by the manufacturer and (3) 15 per cent more mercury than recommended. The 15 per cent variation from the specified ratio was decided upon because it is the approximate variation, either under or over the specified ratio, that can be anticipated when the mercury is not weighed. This percentage was determined by having three members of the dental school staff mix alloys, without measuring ratios, with what they felt were the correct amounts of mercury. Analysis then showed an average variation of approximately 15 per cent in mercury ratio from that recommended by the manufacturer. Mercury and alloy were weighed by means of a Crandall alloy balance which is representative in accuracy of most of the balances now in use.

Amalgamator and Pneumatic Condenser

In this investigation all mixes were made by means of the mechanical amalgamator, not by the mortar and pestle. In previous work it has been found that mixes are consistently more uniform when made with the amalgamator than when mixed by hand,[11] because of reduction in human variables such as pressure on the pestle, speed and such factors. It is known that underamalgamation produces expansion and definite loss in strength whereas long amalgamation causes contraction and increased strength. Therefore, since the length of trituration time does affect the properties of any alloy so markedly, it is important to mix these different ratios as nearly alike as is humanly possible. Only then could any alterations in properties between the various ratios be caused definitely by difference in the per cent of mercury and not by any variation in the length of trituration time. Consequently, the mechanical amalgamator was used and all mixes were made to the same visual consistency (the mixes employing 15 per cent less mercury than the amount specified having the same appearance as the ones containing 15 per cent more mercury). Naturally, the size of the mix made was always the same.

Since two different methods of packing amalgam are employed in practice, both hand pressure and a pneumatic condenser were used in this investigation. A Hollenback condenser was used with a heavy blow of the hammer, after setting the control in notch 14. The diameter of the condenser points in both cases was 2½ mm. and the packing procedure was always identical. The specimens were packed with increasing dryness and the last particles were wrung dry in a towel. These dry portions served to blot up the excess of mercury at the top. Packing was started immediately after the mix was completed, and finished within five minutes.

Mercury Analysis

The procedure for analyzing specimens for the percentage of residual mercury follows the volumetric titration with thiocyanate as outlined by Hillenbrand and Lundell.[12] Tests made on known samples of pure mercury proved the method to be accurate to .02 per cent. The method for extracting the mercury is described as follows:

The specimens were packed in the same steel die that was used later for tests on dimensional change (10 mm. in length and 5 mm. in diameter). After twenty-four hours the plug of hardened amalgam was crushed to 100 mesh in a diamond mortar. A 1-gm.

11. Phillips, R. W., Physical Properties of Amalgam as Influenced by the Mechanical Amalgamator and Pneumatic Condenser. *J.A.D.A.* 31:1308 (October 1) 1944.

12. Hillenbrand, G. E., and Lundell, W. F., *Applied Inorganic Analysis*. New York: J. Wiley and Sons, 1929, p. 172.

Table 1.—Percentage of residual mercury remaining in specimens of three different mercury-alloy ratios when packed by hand and by condenser

Alloy	Mercury Ratio	Method of Packing*	
		Hand	Condenser
A	15 per cent Less	44.75	43.40
	Mfrs. Ratio	46.20	44.00
	15 per cent More	47.50	46.10
B	15 per cent Less	42.80	43.60
	Mfrs. Ratio	43.50	44.10
	15 per cent More	44.50	45.10
C	15 per cent Less	44.00	38.90
	Mfrs. Ratio	43.10	41.70
	15 per cent More	43.80	42.20
D	15 per cent Less	42.00	41.10
	Mfrs. Ratio	44.05	43.10
	15 per cent More	45.45	43.90
E	15 per cent Less	43.00	43.20
	Mfrs. Ratio	44.20	43.50
	15 per cent More	46.60	44.30
F	15 per cent Less	41.50	43.00
	Mfrs. Ratio	42.60	43.90
	15 per cent More	43.45	44.50

*Mixed by mechanical amalgamator.

sample of the powder was weighed on an analytical balance and then placed in a specially prepared pyrex glass tube. This tube was medium heavy walled, 30 to 40 cm. long and 10 mm. in internal diameter, sealed at one end. The tube and contents were placed in an ordinary horizontal muffle furnace and allowed to remain for forty-five minutes at 700-750 C, with the open end of the tube extending 15 to 20 cm. beyond the end of the furnace. The mercury in the sample volatilized and condensed in this end of the tube. It was washed from the tube into a Erlenmeyer flask and dissolved in nitric acid.

Results are shown in Table 1. All the percentages listed represent the average of at least three individual tests. This table shows the actual percentage of residual mercury remaining in specimens twenty-four hours old when three different mercury-alloy ratios were used. Both hand and pneumatic condensers were used in packing. As measured by a simple laboratory balance, the hand pressure, which could be called heavy, was approximately four pounds.

By studying the data for the specimens packed with heavy hand pressure, one can see that, as the mercury content is increased in the original mix, the percentage of residual mercury becomes greater. For example, in alloy A, when 15 per cent less mercury than the amount directed by the manufacturer was used, the percentage of residual mercury is 44.75 per cent; it increases to 46.2 per cent when the prescribed ratio is used; and further increases to 47.5 per cent if 15 per cent more than the prescribed amount is used in the original mix. This holds true for all of the alloys except C, which does not show the definite proportional increase. Usually, an average of 1 to 1.5 per cent more mercury will remain in the filling for each 15 per cent increase made in the original mercury content.

The same results were obtained when the pneumatic condenser was used for packing. In alloy A, for example, there is an increase of 2.7 per cent in residual mercury when the ratio is changed from 15 per cent less to 15 per cent more than the amount specified. For each alloy, as the mercury-alloy ratio was increased, more residual mercury was left in the specimen. Consequently, it is seen that regardless of the method of packing employed, whether it be a heavy hand pressure or condenser blow, if excess mercury is used in the original mix, additional mercury will be retained in the filling. This holds true irrespective of the grain size or the particular ratio that is recommended by the manufacturer. The actual ratios recommended by the manufacturer for the six alloys are: for A—5:10; B, C, D and F —5:8, and for E—6:8.

Physical Properties

Since we have now determined that any variation in the prescribed mercury-alloy ratio will alter definitely the per-

centage of residual mercury in the filling, the next question to be answered is whether that factor actually will affect seriously the physical properties when all the other manipulative variables are controlled.

All of these tests were made with equipment and procedures as required in A.D.A. specification No. 1.[13] Results which are shown are the averages of at least five separate tests.

Table 2 shows the dimensional change in microns per centimeter at the end of twenty-four hours. These specimens were packed by hand. The specification on amalgam states that it shall expand between 3 and 13 microns after twenty-four hours when mixed according to the manufacturer's directions. However, it will be noted from this table that all of these alloys show contraction even when the manufacturer's mercury-alloy ratio is used. This is a result of the fact that they were mixed by the mechanical amalgamator, which will produce contraction in most alloys when mixed to the proper consistency. (Regarding this contraction, we have no definite evidence that dimensional change of this magnitude can be detected clinically.)[14]

The important thing to be observed from this table is that, as more mercury is used in the original mix, the contraction lessens. For example, with alloy A, using 15 per cent less mercury than specified, the contraction is 11 microns per centimeter. The dimensional change drops to only 2 microns contraction when the manufacturer's ratio is used. When the 15 per cent of excess mercury is added, the mix actually expands 1.5 microns. In alloy B, the contraction of 7.9 microns, when 15 per cent less mercury is used, becomes an expansion of 4.5 microns when 15 per cent more mercury is used in the mix. In all of the alloys, except E, which does not definitely follow this pattern, the contraction decreases as the mercury content is increased. The practical significance of these results is that they substantiate the previous findings that more mercury remains in the filling when more is used in the original mix. Since mercury does produce expansion, the decreased contraction as more mercury is used implies that excess mercury must remain after condensation. The actual dimensional change itself, resulting from variation in ratio, probably has no practical significance, because, as I have mentioned, such minute contraction or expansion has not been established clinically.

Force Required for Crushing

Tables 3 and 4 show the force, in pounds per square inch, required to crush a specimen of amalgam at the end of one and twenty-four hour periods. Although a requirement for compressive strength has been deleted from the present specifications, because most alloys now meet the former requirement of 35,000 pounds, some valuable features of amalgam may be learned by a study of the compressive strength. Upon it depends the freedom from breakage and fracture, especially in the early stages. An alloy should have a high compressive strength not only after twenty-four hours, but should gain that strength rapidly so that breakage will not occur with early use of the restored tooth. Prob-

Table 2.—Dimensional change, in microns per centimeter, as influenced by the mercury-alloy ratio

Alloy	Hg—15 per cent Less	Hg—Mfrs. Ratio	Hg—15 per cent More
A	−11.0	−2.0	+1.5
B	− 7.9	−1.2	+4.5
C	− 6.1	−3.0	−1.0
D	− 9.1	−5.0	−3.2
E	− 2.8	−5.0	−1.0
F	−17.5	−8.6	−6.3

Mixed by mechanical amalgamator and packed by hand.

13. Skinner, E. W., *The Science of Dental Materials*. Philadelphia: W. B. Saunders Co., 1946, p. 376.
14. Phillips, R. W., et. al., Clinical Observations on Amalgam with Known Physical Properties—Final Report. *J.A.D.A.* 32:325 (March 1) 1945.

Table 3.—Effect of three different mercury-alloy ratios upon strength of amalgam at the end of one hour

Alloy	Hg—15 per cent Less	Hg—Mfrs. Ratio	Hg—15 per cent More
A	15,500	11,800	11,100
B	12,000	11,400	8,600
C	13,500	10,900	8,200
D	13,900	11,600	8,100
E	16,600	16,000	15,100
F	13,700	11,000	11,400

Mixed by mechanical amalgamator and packed by hand.

Table 4.—Effect of three different mercury-alloy ratios upon strength of amalgam at the end of twenty-four hours

Alloy	Hg—15 per cent Less	Hg—Mfrs. Ratio	Hg—15 per cent More
A	48,300	47,000	46,200
B	49,500	48,700	47,500
C	53,300	51,900	50,400
D	49,000	47,500	47,700
E	50,900	50,800	48,600
F	49,300	49,800	47,600

Mixed by mechanical amalgamator and packed by hand.

ably most fractures in restorations occur as the result of insufficient strength during the early stages of setting. Consequently, we obtained figures for compressive strengths at the end of both one and twenty-four hour periods.

In Table 3 it is seen that as the percentage of mercury is increased the strength at the end of one hour always drops. In alloy A, the compressive strength of 15,500 pounds, for a specimen made with 15 per cent less mercury than the amount specified by the manufacturer, falls to 11,800 pounds if the manufacturer's ratio is used. It then decreases to 11,100 pounds if the mercury content is raised to 15 per cent more than the amount specified. Alloys C and D show a very definite proportional decrease in which there is an average loss of 2,800 pounds for each 15 per cent increase in mercury content. In Table 4 the compressive strength at the end of twenty-four hours shows the same general trend, although the loss in strength is not as great as for the tests made at the end of one hour.

Thus, the more mercury used in the mix, the less the strength, after both one and twenty-four hour periods. This is, of course, the result of the increased percentage of residual mercury left after condensation. It is true that the loss in strength due to increase in the mercury-alloy ratio is not excessive. However, since the success of any amalgam restoration is dependent upon the total effect of all factors which enter into manipulation, it is important to control, so far as possible, any of these variables which will alter the physical properties. The mercury-alloy ratio is one factor that can be controlled easily, and such control will give a more uniformly strong filling.

As seen in these tables, the strongest specimens were obtained with a mix which employed the minimum amount of mercury—15 per cent less than that recommended. Especially is this true for the strength of the specimen at the end of one hour, because the amalgam sets faster, owing to the smaller percentage of mercury, and thus gains its strength rapidly. One might be inclined to recommend this lower mercury content for the greater early strength that it gives, but it must be pointed out that this type of mix cannot be used satisfactorily, since the alloy sets much too rapidly and does not allow proper time for packing and carving. Also, a restoration packed with this particular ratio is grainy and would tend to tarnish more readily in the mouth. Because of the short working time for this ratio, the tendency is for operators who are not weighing out the alloy and mercury to use an excess rather than a lesser amount of mercury. The behavior of the specimens packed with 15 per cent less mercury is of theoretical rather than practical interest, since this ratio is probably not often used. Consequently, we are more inter-

Table 5.—Dimensional change, in microns per centimeter, as influenced by the mercury-alloy ratio

Alloy	Hg—15 per cent Less	Hg—Mfrs. Ratio	Hg—15 per cent More
A	− 9.0	−6.7	−4.2
B	− 4.2	+1.2	+2.3
C	− 8.5	−1.8	−3.0
D	−18.0	−7.0	−4.0
E	− 2.9	+2.0	+1.0
F	−12.1	−5.2	−2.5

Mixed by mechanical amalgamator and packed by pneumatic condenser using heavy blow.

Table 6.—Effect of three different mercury-alloy ratios upon strength of amalgam at the end of one hour

Alloy	Hg—15 per cent Less	Hg—Mfrs. Ratio	Hg—15 per cent More
A	14,600	12,300	11,000
B	13,800	12,600	9,000
C	14,000	12,500	10,800
D	14,300	11,000	8,900
E	17,200	16,300	16,000
F	15,900	13,000	10,300

Mixed by mechanical amalgamator and packed by pneumatic condenser using heavy blow.

ested in the difference between the behavior of the recommended mercury-alloy ratio and that employing 15 per cent excess mercury. As seen here, there is a definite loss in strength at the end of one hour and a slight loss in strength at the end of twenty-four hours as the per cent of mercury is increased. It might also be surmised, from other work done, that tarnish will increase for those fillings made with the 15 per cent excess, because of the higher per cent of residual mercury.

Pneumatic Condenser

In this series of tests, the only variation in procedure was the use of the pneumatic condenser for packing. Table 5 shows the dimensional change. As with the previous series, when hand packing was used, the general trend is for the contraction to be reduced as more mercury is used in the original mix. For example, in the case of alloy B, the contraction of 4.2 microns, with the lower mercury content, actually becomes an expansion of 2.3 microns when the mercury content is 15 per cent over that recommended. This decreased contraction indicates that more mercury is being left in the filling if the original mercury content is increased.

Tables 6 and 7, which depict the strength at the end of one and twenty-four hour periods, show a general loss in strength for each alloy as the mercury content is increased. For the tests at the end of one hour, as the mercury ratio is increased from the manufacturer's directions to 15 per cent excess, the average loss in strength is 20 per cent. For the tests at the end of twenty-four hours, the loss is approximately 7 per cent. The average per cent losses were about the same as when the specimens were packed by hand. Consequently, the use of the pneumatic condenser does not prevent loss in strength when the mercury content is increased. Excess mercury will remain in the filling and weaken it regardless of the method of packing.

Unfortunately, dental amalgams have at least one property in common with plastics. Light loads, only a fraction of that necessary to crush the test specimen, will cause amalgam to shorten or flow. Flow of amalgam can be one of its handicaps and it should be held to a minimum. It is evidenced in the mouth by overhanging margins and flattened contact points. We are now making tests to study the effect of the mercury-alloy ratio upon flow. These tests are not finished, but work already done indicates that the results will be similar to those of the previous tests. As the mercury ratio increases, the flow also increases, owing to the excess mercury left in the filling. In some cases the flow is as high as 7 per cent when the excess amount of mercury is used. This is about double the maximum limit of 4 per cent flow allowed by the specification. Thus excess mercury in the original mix not

Table 7.—Effect of three different mercury-alloy ratios upon strength of amalgam at the end of twenty-four hours

Alloy	Hg—15 per cent Less	Hg—Mfrs. Ratio	Hg—15 per cent More
A	52,900	51,500	48,200
B	49,800	48,200	48,200
C	56,100	50,200	48,500
D	48,000	46,000	45,900
E	49,400	49,000	49,000
F	51,600	50,700	49,800

Mixed by mechanical amalgamator and packed by pneumatic condenser using heavy blow.

only lowers the force required to crush the specimen but also produces greater flow which increases the susceptibility of the filling to distortion under stress in the mouth.

Conclusions

1. Chemical analysis shows that, as the mercury-alloy ratio is increased, the percentage of residual mercury also increases proportionally. For each additional 15 per cent of mercury used in the original mix, there is an average increase of 1 to 1.5 per cent of residual mercury. If more mercury is used in the mix, regardless of the method of packing, more mercury remains in the restoration.

2. Crushing strengths of the specimens at the end of one and twenty-four hour periods decrease as the original mercury-alloy ratio is increased. This is true regardless of the method used in packing, and reaches an average loss of 20 per cent at the end of one hour if the mercury content exceeds the manufacturer's directions. There is an average loss of strength amounting to 7 per cent at the end of a twenty-four hour period.

3. Flow increases as mercury content is increased, in some cases reaching a value of 7 per cent.

4. Excess mercury used in trituration will lower the early crushing strength, increase the flow, and reduce the resistance of the restoration to corrosion and tarnish.

5. Since the success of the amalgam restoration is dependent upon all of the variables involved in manipulation, the control of each is essential. Every variable that can be standardized in our technic, when working with amalgam, is additional assurance of a good filling. This study indicates that the general loss in strength and increase in flow, caused by using the improper mercury-alloy ratio, are definite although not excessive. Because the proper ratio can be maintained so easily, and because a stronger restoration will result, every dentist should take the time to use the correct mercury-alloy ratio.—*School of Dentistry, Indiana University.*

Children's Medical Center.—Plans have recently been completed for the transformation of the Children's Hospital of Boston into a medical center for children. The pattern of the plan has been chosen to provide the finest care possible for the healthy as well as the sick. The logic of providing in one place all of the specialized technics and knowledge which may be applied to the healthy or sick infant, child or adolescent, is clear. The availability to doctors throughout the New England area of expert diagnostic facilities with provision for consultation concerning treatment should answer a vital need long apparent.—*Harvard Medical Alumni Bulletin, April 1946.*

THE USE OF PENICILLIN IN TREATMENT OF THE ROOT CANAL

N. N. Potkin,* D.D.S., Chicago

RECENT discoveries in the field of chemotherapy have brought to the attention of the dental profession new and powerful agents. Some of these may have a beneficial action in the field of treatment of the root canal. A review of the literature shows evidence that penicillin combines two desirable and necessary qualities, that is, a low toxicity to tissue cells and a powerful bacteriostatic action.[1]

The spectacular story of penicillin since its description by Fleming in 1929 is now well known to all. The work of Florey and others is less familiar. These men were the first to make a detailed study of the action and effects of penicillin. They found that the production of penicillin took place in a wide range of oxygen tension and that the mold grew satisfactorily at 24 C. The addition of yeast extract accelerated the growth of the mold. They found evidence of low toxicity of penicillin when it was applied directly to body tissue and also showed that the growth of many pathogenic bacteria was prevented by penicillin in great dilution.

It was my belief that investigation into the action of this drug in treatment of the root canal might reveal a method of treatment which would be less toxic to the periapical tissue and yet would exert a powerful bacteriostatic effect. Penicillin has been used for only a comparatively short time in dentistry and only casually in treatment of the root canal. In order to control and measure the effects of the drug as it would be used in root canal treatment, a method of bactericidal determination was developed.

Materials and Method

The first problem was to devise a means of carrying a known amount of penicillin into the root canal. A solution of sodium penicillin,* which contained 100,000 Oxford units, was made. Only that amount of distilled water which would be absorbed by two hundred paper points was used. Thus, each point contained 500 units of penicillin. The points were divided into groups of ten, placed in sterile glass vials and kept stored at 5 to 10 C.

The second problem was to devise a method for testing the potency of penicillin paper points and at the same time have a visual means of comparison. An agar spread plate (1.5 per cent agar, 0.6 per cent beef extract and 1 per cent peptone) was streaked in quadrants with a standard laboratory strain of Staphylococcus aureus (No. 209).† A penicillin paper point moistened with sterile saline solution was placed on two quadrants, and the plate was incubated at 37.5 C. This inoculated plate, after forty-eight

Presented as a table clinic at the meeting of the American Association of Endodontists, Chicago, February 14 and 15, 1946.

*Department of Applied Materia Medica and Dental Therapeutics, University of Illinois.

1. Abraham, E. P.; Chain, E.; Fletcher, C. M.; Gardner, A. D.; Heatley, N. G.; Jennings, M. A., and Florey, H. W., Further Observations on Penicillin. *Lancet* 2:177 (August 16) 1941.

*Supplied by E. R. Squibb & Sons, Inc., New York. Lot No. 3438-1; expiration date November 1, 1946.

†Supplied by American Type Culture Collection, Georgetown University, School of Medicine, Washington, D. C.

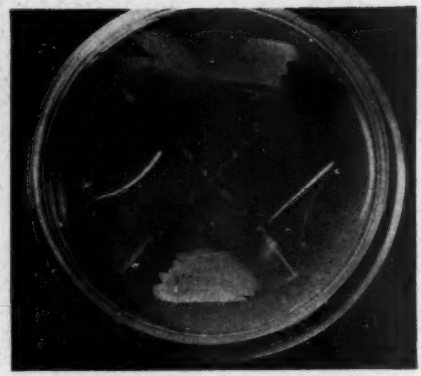


Fig. 1.—Agar plate streaked with Staph. aureus and penicillin paper points showed no growth of Staph. aureus in quadrants containing penicillin paper points

hours of incubation, showed no growth in the quadrants exposed to the penicillin (Fig. 1). When a hemolytic streptococcus was used, there likewise was no growth or hemolysis after incubation for forty-eight hours. To check these results, controls were made. Sterile absorbent paper points moistened with saline solution or distilled water produced no inhibition (Fig. 2).

To compare the zones of inhibition produced by other drugs used in treatment of the root canal, agar plates were inoculated with Staph. aureus. Paper points containing penicillin, beechwood creosote, eugenol, chloramine-T (2 drops), beechwood creosote with iodine,

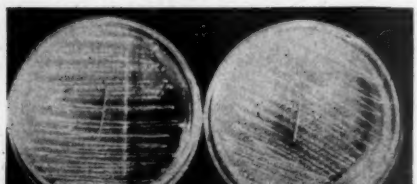


Fig. 2.—No inhibitory effect on Staph. aureus. Left: Sterile paper point moistened with sterile saline solution. Right: Sterile paper point moistened with sterile water

beechwood creosote with eugenol, cresol and a mixture containing equal amounts of menthol, thymol and phenol were placed on the inoculated plates. These plates were incubated for forty-eight hours and the zones of inhibition were photographed (Fig. 3). The greatest zone of inhibition was obtained with a penicillin paper point. The other zones of inhibition, in order of degree, were as follows: phenol mixture, cresol, eugenol, beechwood creosote with eugenol and beechwood creosote with iodine. The smallest zone of inhibition was obtained with chloramine-T. This experiment also showed the interesting result that the combination of two of the drugs produced a smaller zone of inhibition than did either of the drugs used singly. The use of beechwood creosote in combination with iodine or eugenol resulted in a smaller zone of inhibition than did either beechwood creosote or eugenol used alone.

Activity of Penicillin

Penicillin paper points were placed in root canals for different definite lengths of time and then were placed on agar plates and incubated at 37.5 C. to determine whether they had any inhibitory action on Staph. aureus. The results obtained are shown in the table. The same tooth was used for the activity test. The pulp was vital and the canals were dry. These conditions were favorable for the prolonged action of penicillin. In order to obtain and maintain activity of penicillin paper points in root canals, the points were moistened with a drop or two of sterile saline solution. If the penicillin had lost its effectiveness in seventy-two hours under these conditions, it could not be expected to last longer in moist putrescent root canals (Fig. 4). However, a point which had been sealed in a moist necrotic canal for forty-eight hours and was tested similarly still had the ability to inhibit the test organism.

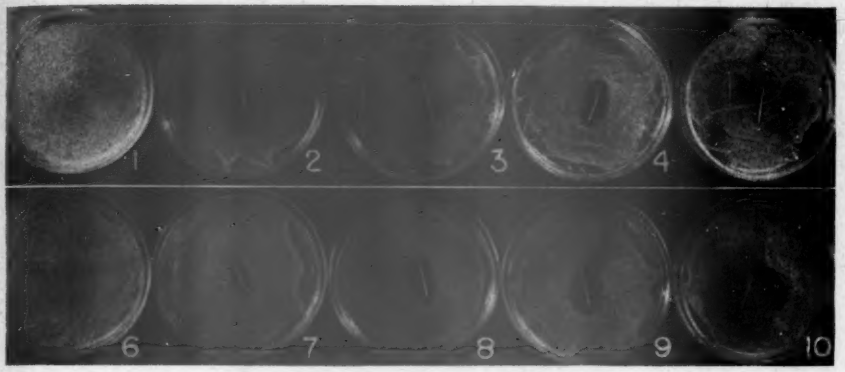


Fig. 3.—Inhibitory effect on Staph. aureus. 1, control; 2, penicillin; 3, beechwood creosote; 4, eugenol; 5, chloramine-T; 6, control; 7, beechwood creosote with iodine; 8, beechwood creosote with eugenol; 9, cresol; 10, phenol mixture

To study the possible countereffects of other drugs commonly used in treatment of the root canal, penicillin paper points were used in combination with beechwood creosote, eugenol, chloramine-T, beechwood creosote with iodine, beechwood creosote with eugenol, cresol and phenol mixture. Five hundred units of penicillin per point and 2 drops of the other drugs were used. These points were placed on agar plates containing Staph. aureus and incubated for forty-eight hours. Both beechwood creosote and cresol with penicillin produced larger zones of inhibition than did beechwood creosote or cresol alone. Eugenol and chloramine-T produced marked zones of inhibition when used in conjunction with penicillin paper points. Apparently the drugs commonly used in treatment of the root canal do not inactivate the penicillin (Figs. 5 and 6).

The potency of the penicillin paper points during prolonged storage in a refrigerator was tested as follows: Each week a point was removed from the refrigerator, placed on the surface of an agar plate inoculated with Staph. aureus and incubated at 5 to 10 C. Then the zone of inhibition was observed. This procedure was repeated for twenty-three weeks. A point stored for twenty-three weeks was found to have the same inhibitory ability as the points tested immediately after preparation.

Reports of Cases

The 6 patients described in the following reports are a few of those that have been treated. These patients and others treated by this method are being followed up semiannually, both roentgenologically and clinically. For every sitting a rubber dam was utilized, and a surgically clean operating field was maintained.

Case 1.—A white man, aged 33 years, required treatment of an upper right second

Inhibitory action of penicillin against Staph. aureus

Time penicillin remained in canals	Inhibitory action after removal from canals
10 min.	Maximum
20 min.	Maximum
30 min.	Maximum
1 hr.	Maximum
2 hr.	Maximum
24 hr.	Maximum
48 hr.	Maximum
72 hr.	Moderate
96 hr.	None
1 wk.	None

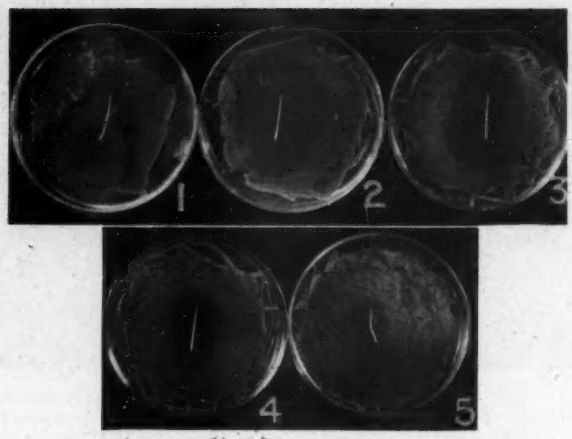


Fig. 4.—Plate 1 demonstrates the effect of a penicillin paper point on Staph. aureus after ten hours; 2, twenty-four hours; 3, forty-eight hours; 4, seventy-two hours, and 5, ninety-six hours

bicuspid exposed by caries. The pulp was necrotic, and the tooth was tender to percussion. After the tooth was opened, drainage was established through the canal. After the usual drugs employed in treatment of the root canal were used, the tooth still remained tender to percussion. A dry penicillin paper point was placed within the root canal and then moistened with sterile saline solution. The tooth was sealed for twenty-four hours. The tenderness increased. A second penicillin paper point was placed within the canal, and the tooth was sealed for forty-eight hours. The tenderness subsided, and negative cultures were obtained in two subsequent sittings. The bucuspid was filled with gutta-percha cones without further medication.

Case 2.—A Negro, aged 14 years, had a root canal filling and a granuloma at the apex of the distal root of the lower right first molar. Cresol and the phenol mixture were employed, but positive cultures persisted. Penicillin paper points were placed in the root canals for forty-eight hours, and a negative culture resulted. The same treatment was repeated, and again a negative culture was obtained. Without further medication, the root canals were filled with gutta-percha cones.

Case 3.—A Negress, aged 38 years, came to the infirmary for treatment of a lower right cuspid with a necrotic pulp. Roentgenologic examination revealed a granuloma at the apex. The canal was moist, and the tooth was not tender to percussion. A penicillin paper point was placed within the canal, and a positive culture resulted after ninety-six hours. The penicillin treatment was repeated, and a negative culture was obtained after forty-eight hours. A third penicillin paper point was employed, and after seventy-two hours a negative culture resulted. No other medication was used, and the tooth was filled with gutta-percha cones.

Case 4.—A Negro, aged 35 years, required treatment of an upper left second molar with a necrotic pulp. The canals were moist, and the apexes were normal on roentgenologic examination. Beechwood creosote and eugenol had been used for four sittings, and positive cultures resulted in every instance. Penicillin paper points were employed during the fifth sitting, and twenty-four hours later the culture was negative. After the second negative culture was obtained, the tooth was filled with gutta-percha cones.

Case 5.—A Negress, aged 15 years, had an upper left first bicuspid with a necrotic pulp. The canals were moist, and the tooth was tender to percussion. For four sittings, chloramine-T and beechwood creosote with iodine were used, and positive cultures resulted. The tooth remained tender to percussion. Penicillin

Fig. 5.—Effect of penicillin with other medicaments on Staph. aureus. 1, chloramine-T; 2, chloramine-T with penicillin; 3, eugenol; 4, eugenol with penicillin; 5, beechwood creosote; 6, beechwood creosote with penicillin

paper points were inserted at the fifth and sixth sittings and allowed to remain for twenty-four to forty-eight hours. The tenderness subsided, and negative cultures were obtained. No other medication was employed, and the tooth was filled with gutta-percha cones.

Case 6.—A Mexican girl, aged 14 years, came to the infirmary for treatment of a lower molar with a vital pulp exposed by caries. Zinc oxide and eugenol were employed at the first sitting. At the second and third sittings, penicillin paper points were placed within the canals, and negative cultures were obtained after forty-eight hours. Without further medication, the tooth was filled with gutta-percha cones.

Discussion

Teeth that are tender to percussion and are difficult to keep sealed by other means or drugs respond well to treatment with penicillin. Penicillin will not always sterilize root canals when other agents fail; nevertheless my results suggest that penicillin is effective in many cases. Cultures of untreated necrotic pulps and of necrotic pulps persistently positive after other medications were negative after twenty-four hour contact. Penicillin paper points are not active within the root canal after seventy-two hours. Penicillin paper points removed from root canals after seventy-two hours when incubated with Staph. aureus showed no inhibitory action in every case. Penicillin paper points were used successfully for 30 other patients who required treatment of the root canal. Therefore, it is reasonable to say that penicillin paper points are apparently effective for seventy-two hours. Penicillin in solution is far more active than in the dry state.

Conclusions

1. Moist penicillin paper points in root canals are effective for seventy-two hours.
2. Penicillin paper points moistened with sterile saline solution are far more active than dry points.
3. Penicillin paper points have a marked bactericidal and bacteriostatic action.
4. Paper points prepared with sodium

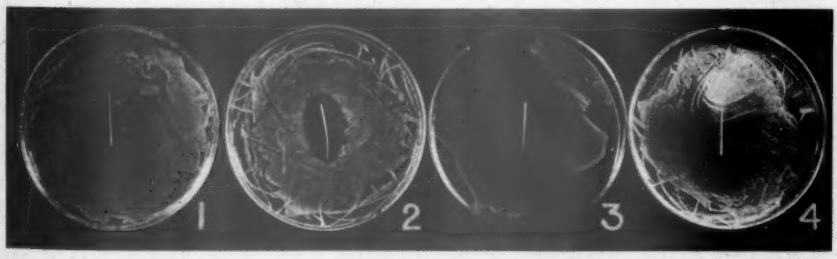


Fig. 6.—Synergistic effect of penicillin and beechwood creosote. 1, sterile paper point; 2, beechwood creosote; 3, beechwood creosote with penicillin; 4, penicillin

penicillin and kept refrigerated retain their effectiveness at least twenty-three weeks.

5. Other drugs used in treatment of the root canal, in combination with penicillin paper points, do not inactivate the penicillin. A synergistic action is the result. —*1 North Crawford Street.*

PENICILLIN IN THE TREATMENT OF VINCENT'S INFECTION

Norman L. Wihr,* D.D.S., San Francisco

VINCENT'S infection has been treated with varying degrees of success by nearly every therapeutic agent in the armamentarium of both physicians and dentists. A comparative study of representative methods of treatment which have been commonly employed by members of the dental profession was undertaken by the oral hygiene section of Fitzsimons General Hospital, Denver, Colo., during 1944.[1]

The results obtained from this study presented three main disadvantages: (1) by the use of strong caustic and escharotic agents there was considerable tissue destruction; (2) there was often unsightly discoloration of the patient's mouth and teeth; and (3) a long period of time was required to obtain a cure. These disadvantages led to a search for a more satisfactory method of treatment. In the later study, on which this report is based, two general methods of treatment were utilized: (1) intramuscular injections of penicillin and (2) topica' application of the drug about the necks of the teeth. This latter method proved more practical for dentists to employ in their offices.

Diagnosis

The following clinical symptoms, almost in toto,[2] have been accepted by the dental profession as necessary for a diagnosis of Vincent's infection.

(1) Highly inflamed mucosa with engorgement of the interdental papillae.

(2) Ulceration of those papillae which are ragged and raw and which bleed freely and are covered with an easily removed, grayish pseudomembrane.

(3) Usually inverted papillae presenting a crater-like appearance.

(4) Characteristic fetid odor.

(5) Considerable pain of the gingivae about the teeth with an accompanying recession of the gums.

In the more advanced cases systemic involvement was noted to include an increase in temperature, enlargement of the regional lymph glands and a general malaise. In many of these cases there were ulcerations on the throat, palate and cheeks.

Further to substantiate a diagnosis of Vincent's infection a smear was made from the gingival crevices of each patient. This was sent to the laboratory for iden-

*Major (DC) AUS.

1. Wihr, N. L.: A Comparison of Treatment Methods for Vincent's Stomatitis. J.A.D.A. 33:797, June 1, 1946.

2. Lyons, D. C.: A Monograph on the Bacteriology and Control of Vincent's Infection and the Associated Diseases. D. Items Interest 65:211, March 1943.

tification of organisms present. If the report indicated that Borrelia vincenti and Fusiformis dentium were present in appreciable numbers the diagnosis was considered as positive. Treatment with a definite concentration of penicillin was undertaken and continued until the eradication of all clinical symptoms was accomplished and a smear report was returned from the laboratory indicating the absence of the organisms mentioned.

The disappearance of clinical symptoms occurred in a much shorter time than was required to obtain a negative report from the laboratory. Failure to recognize this point may account for the premature dismissal of supposedly cured patients. These persons frequently returned after renewed outbreaks of the infection. In such cases it is believed that the original infection was never cured. Relief from the immediate acute symptoms only was obtained.

From January 1945 to and including October 1945, when this study was terminated, 396 patients with Vincent's infection were treated by the oral hygiene section. Of this number, 306 patients were continued to completion of treatment and considered as cured.

The difference between the number of patients diagnosed and the number of those cured is accounted for by the fact that patients are not retained in the hospital solely for dental disturbances, so are often transferred to other installations for continued medical or dental treatment. Also, many of the patients diagnosed were transient soldiers traveling from one station to another and could be given only palliative treatment. A limited number of civilian dependents over which there is no military control are treated in the hospital dental clinic. Many of this latter group failed to return after their discomfort was relieved.

The selection of patients for this study was made in the order of their appearance for treatment at the dental clinic. The first forty or fifty patients who reported were all treated with one selected concentration of penicillin regardless of the severity or extent of the infection. The next forty or fifty patients were treated with another concentration and so on. This procedure was repeated throughout the entire study in order to eliminate errors which would have been made by selecting individual patients for a particular type of treatment.

The patients were arbitrarily classified as slight, medium and severe cases, depending upon the severity of clinical symptoms. The slight cases were those in which only a few interdental papillae were involved. The severe cases were those presenting involvement of all interdental papillae and the surrounding gingival tissue. This group included those patients with extension of the ulcers to the palate or cheeks. Cases falling between these extremes were classified as medium. This group represented the average cases of Vincent's infection as seen by the clinician and comprised the greatest number of patients. To reduce errors in judgment in the assignment of patients to these categories, it was decided that I should determine to which of these groupings each should be assigned. Through this method the personal error in judgment would tend to adjust itself over a large number of cases.

Treatment by Injection

The cases of Vincent's infection in which intramuscular injections were used included only those cases which were severe enough to cause marked systemic reactions. These reactions included an increase in temperature, enlargement of the regional lymph glands and the appearance of suffering from general malaise. Hospitalization was required in these cases. As the frequency of occurrence of such cases was rather rare, those patients treated intramuscularly in 1944 have been included in this report.

The patient was injected intramuscularly with a daily total of 120,000 units of penicillin in doses of 15,000 units every three hours. These injections were continued until clinical symptoms were eliminated and a negative report for the organisms of Vincent's infection was returned from the bacteriologic laboratory. A mouth wash of 3 per cent hydrogen peroxide diluted with warm water to 1.5 per cent strength was used by the patient hourly when awake. The results of this method of treatment will be discussed later in this article. It was noted from the daily bacteriologic smear reports that there was a gradual diminution of bacteria present on the smears while the treatment was progressing.

Treatment by Topical Application

Treatment by topical application consisted of irrigations about the dried necks of the teeth with a selected concentration of penicillin.

For this method of treatment it was determined by experimentation that 6 cc. of the vehicle (sterile water) was required for each treatment to irrigate the gingivae about the teeth completely. The penicillin utilized in this study was of various commercial brands of crystalline penicillin sodium dispensed in sterile bottles, each containing 200,000 Oxford units. To obtain a desired concentration of penicillin in 6 cc. of sterile water it was often necessary to transfer the crystalline penicillin to other sterile bottles of larger size by first dissolving the crystals in small amounts of sterile water before such transfer. This was especially true for the lower concentrations of penicillin.

After the desired concentration of penicillin had been made, a glass Luer syringe of 3 cc. capacity was used to transfer the penicillin solution from the sterile bottle to the mouth. This syringe was of a size sufficient to permit the irrigation of each dental arch without refilling. A one-half inch 25 gage stainless steel Luer type needle was modified by blunting the point and bending the needle to a 25 or 30 degree angle, permitting an easier access to the gingival crevices about the necks of the teeth. A similar needle, not modified, was used to remove the penicillin solution from the sterile bottles.

Technic of Application

Each dental arch was arbitrarily divided into three sections, the cuspids being used as the point of demarcation. The teeth of each third of each arch were treated separately by blocking off that area with cotton rolls. The surfaces of the gingivae and teeth in the third of the arch to be treated were carefully dried with a warm air pressure syringe. All saliva and loose débris were similarly removed from the depths of the periodontal pockets. The penicillin was deposited from the Luer syringe by placing the blunt end of the syringe needle in the gingival pocket slightly below the gingival crest. Care was taken while depositing the penicillin to carry the blunt needle well into the interproximal spaces and to encircle the tooth completely with penicillin.

When one-third of the arch had been treated, the adjoining third was then irrigated. One cubic centimeter of penicillin solution was deposited about the teeth of each third of one arch. Upon completion of one arch, the same process was continued on the opposite arch. For convenience, the irrigations were first accomplished on the lower arch. The patient was instructed to keep the mouth open throughout the entire treatment so that a contact of the gingivae with penicillin was obtained for a time varying from two to five minutes before the patient expectorated. No rinsing of the mouth or drinking of liquids was permitted in the office, thus prolonging the tissue contact with penicillin.

Regardless of how soon the patient

rinsed his mouth after leaving the treatment room, the contact time of the penicillin with the tissue would be much longer than might be expected, owing to the inability of the saliva, in sufficient quantity, to dilute the penicillin in the depths of the gingival pockets.

Penicillin was used in concentrations varying from 1,000 to 100,000 units per 6 cc. of sterile water. These doses were applied at one sitting and formed the total daily dosage.

Results

The results of this study are shown in Table 1. The first column, "Treatment Method," lists the various concentrations of penicillin utilized in the topical application method. The intramuscular injection method, utilizing 120,000 units per day, is also listed in this column. The next column, "Number of Cases," shows the number of cases handled by each method. These numbers are listed separately for each degree of severity. The last column, "Average Number of Days for Cure," shows the number of days required to obtain a cure substantiated by a bacteriologic smear for each degree of severity as well as for each concentration of penicillin.

It will be noted that there is only a small difference in time required to obtain cures after using 1,000 units, 5,000 units or 25,000 units of penicillin. A marked shortening of treatment time was observed after the use of 50,000-unit treatments, while cures were obtained in approximately two days after using 100,000 units per treatment. Patients have stated that within two or three hours after application of 100,000 units of penicillin there was a marked reduction in severity of pain and within twenty-four hours practically no discomfort was felt.

The 100,000-unit concentration of penicillin has become the medicament of choice at Fitzsimons General Hospital.

Auxiliary Care

Home care consisting of a mouth wash of 1.5 per cent dilution of hydrogen peroxide four times a day was instituted in all cases. In some cases a formula consisting of hydrogen peroxide, Fowler's solution, ipecac and glycerin was prescribed as a substitute for hydrogen peroxide. There was no difference between the results obtained with either solution.

Mouth prophylaxis was undertaken in some cases. In others, no calculus removal was done. It was noted that the tissue returned to normal more rapidly with the elimination of the hard irritants. All patients were given a careful mouth prophylaxis upon completion of treatments. This was done on the assumption that with proper mouth hygiene the soft tissues are more resistant to infections. This fact appears to be confirmed by the small number of patients returning for treatment with renewed cases of Vincent's infection. Thirteen patients, or ap-

Table 1.—Results in cases of varying severity treated with various concentrations of penicillin

Treatment Method	Number of Cases			Average Number of Days for Cure		
	Slight	Medium	Severe	Slight	Medium	Severe
1,000 units	7	20	5	4	8	20
5,000 units	3	17	11	5	7	15
25,000 units	5	45	22	3	7	13
50,000 units	4	60	11	2	4	8
100,000 units	7	61	8	1	2	4
120,000 units intramuscularly			20			4-5

proximately 3 per cent, have returned. As it is impossible to control the living habits of patients after they have been freed of the organisms and dismissed from the clinic, it cannot be certain if these cases are recurrences of the original infection or new infection.

Those patients treated intramuscularly showed a cure in four or five days. In one instance a cure was obtained in three days. Two patients required six days each. Within forty-eight hours these were so markedly improved that three patients were able to take a regular diet instead of a liquid or soft diet. There has been no return of these patients with recurrence of the infection.

Summary

From the results obtained during this study, it is believed that methods of treatment employing penicillin are more rapid and present fewer disadvantages than other methods of treatment. These methods, therefore, could easily be utilized by the clinician in the routine treatment of the disease.—*648 Flood Building.*

INTERNAL RESORPTION OF TEETH: INTERPRETATION OF HISTOLOGIC FINDINGS

George R. Warner, M.D., D.D.S., Denver; Balint Orban, M.D., D.D.S., Chicago; Maynard K. Hine, D.D.S., Indianapolis, and Beryl T. Ritchey, D.D.S., Colorado Springs, Colo.

Loss of cementum and dentin from the roots of teeth is a common pathologic occurrence. Almost every adult tooth that is carefully examined under the microscope shows at least minute regions of resorption of the root, usually with repair. In most instances this resorption is of no significance, but occasionally the process becomes so extreme that the tooth attachment is severely damaged.

Root resorption is most commonly found in the apical region, although it may begin at any point where the tooth is covered by connective tissue. Occasionally the resorption begins within the tooth, resulting in so-called internal resorption. If the resorption extends into the crown, it might produce pink spots, which apparently first were described by Miller.[1] Root resorption and internal resorption occur by osteoclastic action and are not at all similar to dental caries.

The attention of one of us (G.R.W.) first was called to this condition in 1928 by the dental roentgenogram of a man in his early twenties. Ocular and instrumental examination of the tooth revealed nothing of significance. The lower first molar responded more slowly to testing with ice than the rest of the teeth. Since the roentgenogram gave the first evidence that this tooth was different from the other teeth, the condition was called "in-

From the Department of Research, School of Dentistry, Loyola University, Chicago College of Dental Surgery.

1. Miller, W. D., A Study of Some Dental Anomalies with Reference to Eburnitis. *D. Cosmos* 43:845 (August) 1901.

Fig. 1.—Progress of resorption. Left: Lower first molar at border of coronal and root portion (1928 and 1943). Right: Upper second bicuspid (1935 and 1936)

ternal radiolucence" (Fig. 1, upper left).[2] Fortunately this tooth has been kept under observation, and a roentgenogram made in 1943, about fifteen years after the first examination, shows relatively little change, although the region of radiolucence is somewhat smaller (Fig. 1, lower left). Not much change could

2. Some of the roentgenograms in this article have been retouched to improve reproduction.

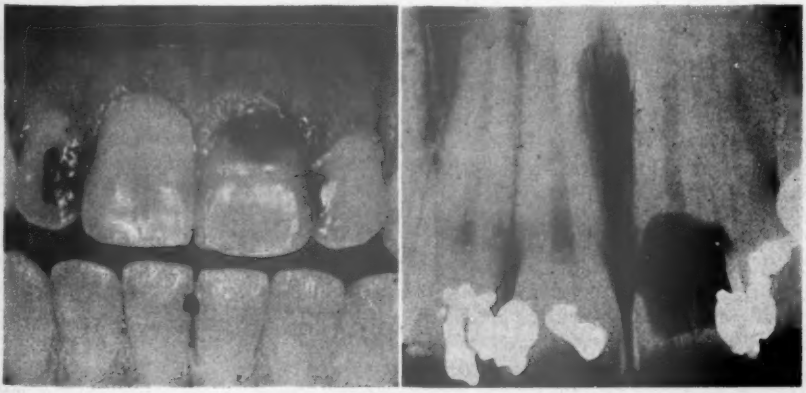


Fig. 2.—Pink spot on central incisor

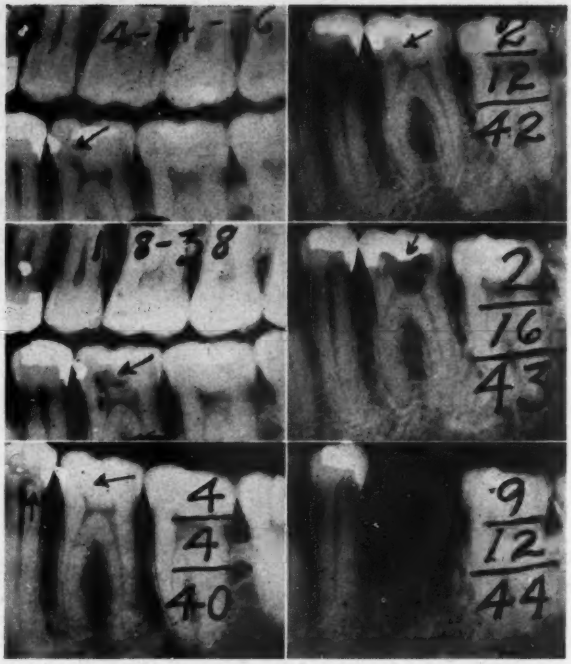


Fig. 3.—Resorption in lower first molar (1936 to 1944)

be noticed in the vitality test, but the patient and the operator think that the response is now more nearly normal than in former tests.

In our experience, as well as that of others, there are cases in which the resorption progresses rapidly and others in which it progresses slowly or remains static so far as can be discerned roentgenographically or by clinical tests. There are also cases in which repair can be observed.

Historical Material

Soifer[3] presented a case in which the maxillary central incisors and mandibular left second bicuspid were involved. Fortunately, he had roentgenograms of the central incisors when resorption had hardly started. Two years later he noticed that one of the incisors was turning pink. Roentgenograms revealed extensive resorption. One year later the resorption had progressed to the point that the teeth had to be removed. The histologist reported that examination of sections of the teeth indicated that the resorbed regions were filled with mature connective tissue.

Mummery[4,5] found fatty degeneration of the pulp in some cases, giant cells absorbing dentin in 1 case and granulation tissue in some cases in which the pulp itself had been greatly absorbed.

Cahn[6] found in 1 tooth in which there

3. Soifer, M. E., Internal Resorption of Teeth—a Case History. *D. Items Interest* 59:119 (February) 1937.

4. Mummery, J. H., The Pathology of "Pink Spots" on Teeth. *Brit. D. J.* 41:301 (April 1) 1920.

5. Mummery, J. H., Some Further Cases of Chronic Perforating Hyperplasia of the Pulp (the So-Called "Pink Spot"). *Brit. D. J.* 47:801 (July 15) 1926.

6. Cahn, L. R., A Case of Bone Metaplasia in the Pulp Canal of a Tooth. *D. Items Interest* 54:518 (July) 1932.

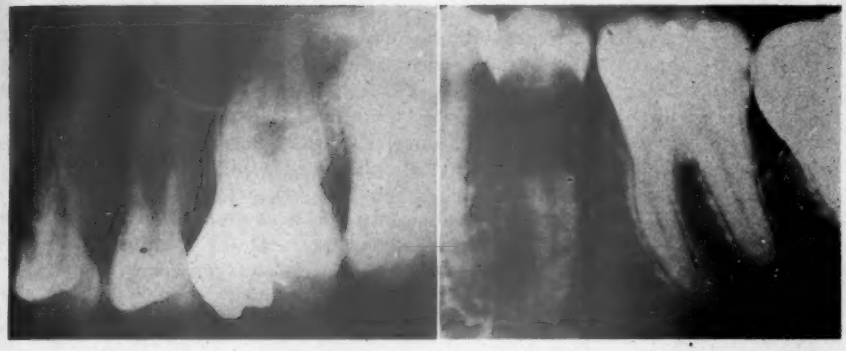


Fig. 4.—Resorption. Left: Root of upper second bicuspid (specimen by courtesy of Dr. C. M. Stebner, Laramie, Wyo.). Right: Lower second bicuspid

was a hole in the center of the root that the dentin had been resorbed and that in portions of the periphery of the resorbed regions there had been a deposition of true bone. This was considered to be metaplasia.

Hopewell-Smith,[7] contrary to the opinion of some writers, did not believe that external and internal disappearance of dentin in permanent teeth was due to osteoclastic action.

In 1935, Thoma[8] reported a case of internal loss of dentin and osteodentin in a mandibular third molar which had to be removed because of infection of the pulp. In 1944, he discussed the subject under the title "Idiopathic Resorption of the Tooth with Metaplasia."[9] Thoma's explanation of the resorption was metaplasia of the tissues. He divided resorption of teeth into internal and external types, depending on where the process starts. He also claimed that the process consisted not only of resorption but also of alternating resorption and bone formation.

Applebaum[10, 11] described a number of cases of internal resorption of teeth. Rosenthal[12] reported a case which was illustrated with roentgenograms.

Aisenberg[13] stated that there are "two known types of internal resorption; one in root canal; one in coronal pulp. Chronic infection causes former. Etiology of latter unknown; usually attributed to systemic disorder. One such case described. Both constructive and destructive processes present. Pulp converted to adult connective tissue. Resorption in one instance caused pulpal exposure. Epithelial proliferation through lateral perforation resulted in cyst formation in pulp. Epithelium traced to rests in periodontal membrane. Resorbed surfaces undergoing repair with secondary cementum. Bone metaplasia in pulp of one tooth."

Kronfeld[14] said, "As a rule, the clinical diagnosis of internal resorption is not difficult. Any radiographically visible defect in a tooth that is not caused by caries must be the result of a resorptive process

7. Hopewell-Smith, A., The Process of Osteolysis and Odontolysis, or So-Called "Absorption" of Calcified Tissues: A New and Original Investigation. *D. Cosmos* 72:323 (April) 1930.

8. Thoma, Kurt, Central Osteoclastic Resorption of Dentine and Complete Repair with Osteo-Dentine in the Permanent Molar of an Adult. *D. Items Interest* 57:28 (January) 1935.

9. Thoma, Kurt, *Oral Pathology*. St. Louis: C. V. Mosby Company, 1944, p. 510.

10. Applebaum, E., Internal Resorption of Teeth. *D. Cosmos* 76:847 (August) 1934.

11. Applebaum, E., Internal Resorption of Teeth (II). *Bul. D. Soc. New York* 5:21 (January) 1938.

12. Rosenthal, H. B., A Case of Internal Absorption. *D. Items Interest* 58:826 (September) 1936.

13. Aisenberg, M. S., Internal Resorption. *J. D. Res.* 16:299 (August) 1937.

14. Kronfeld, R., *Histopathology of the Teeth*, Philadelphia: Lea and Febiger, 1939, p. 281.

of some kind. More difficult is the pathological interpretation. Two possibilities exist: Either the resorption originated from the pulp, began inside of the tooth, and progressed from the pulp cavity outward, or it originated in the periodontal membrane and invaded the pulp chamber from without."

In spite of extensive clinical and histopathologic investigations, it is not clear how internal resorption begins. Can one speak of a metaplasia of the pulp tissue or are resorption and repair possible without metaplasia?

Reports of Cases

We, as well as various other observers, have noted that there is occasionally noncarious loss of dentin with an external opening just beyond the cemento-enamel junction. This condition was found by one of us (M.K.H.) on the labial surface of a maxillary central incisor of a patient about 24 years of age (Fig. 2). The crown was hollowed out, and a large pink spot appeared on the labial aspect of the tooth. The primary resorption may have started from the periodontal membrane and spread rapidly within the dentin into the coronal part, although probably this was true internal resorption which perforated the crown.

Although some writers attribute internal resorption to a probable systemic disturbance, one of us (G.R.W.) has been unable to relate any of his cases to any systemic disturbance. In some cases in which the condition occurred in the teeth of physicians, a rather determined but unsuccessful effort was made to ascertain whether the condition was attributable to a local or general systemic cause.

Figure 3 shows the teeth of a man in his fifties, a physician in good health.

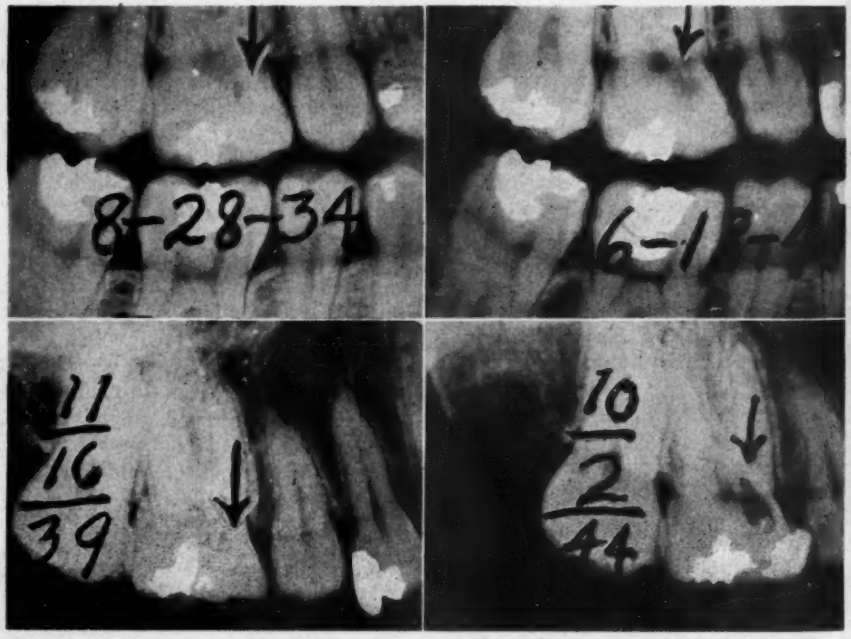


Fig. 5.—Progressive resorption in upper first molar (1934 to 1944) (see Figs. 6 and 7)

The slight dentinal change in the lower first molar first was noticed in 1936. The response to vitality tests showed no appreciable difference between the affected first molar and the adjoining teeth or the first molar on the opposite side. In the roentgenogram made in 1938 the internal resorption of dentin is much more noticeable than in that made in 1936. In 1940, for the first time, a radiolucent region was evident in the adjoining bicuspid and marked diminution of the radiolucent region in the molar. In the roentgenogram made in 1942 the internal resorption is less apparent in the molar but more noticeable in the bicuspid. Resorption seemed to be progressing in the bicuspid although there was apparently repair in the molar. However, in the spring of 1943, a routine roentgenographic examination showed that rapid resorption of dentin had taken place in the molar since the last visit. A vitality test now produced a quick and painful response. The tooth still gave no other subjective symptoms, but shortly thereafter its removal was necessary. A year later a roentgenogram showed little change in the second bicuspid and no evidence of internal resorption elsewhere in the mouth.

Figure 4, left, shows a maxillary second bicuspid with resorption. The patient, a woman in her early thirties, had arthritis and an inflammatory condition of the eye on the same side as the involved tooth. She insisted on having the tooth removed although there had been no subjective symptoms. The tooth did not respond on

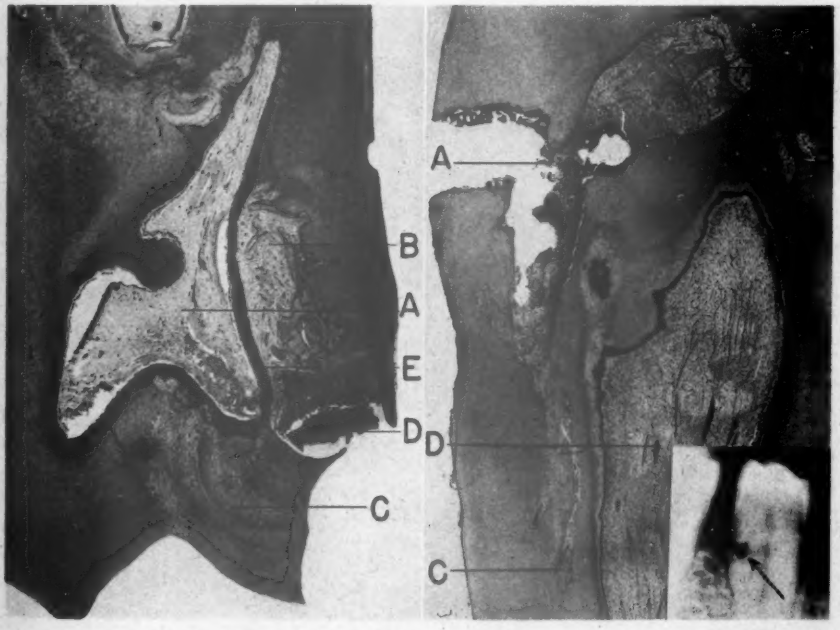


Fig. 6.—Left: Same tooth as shown in Figure 5. A, pulp; B, resorption into root portion; C, repaired resorption extending into coronal dentin; D, mechanical exposure with inflammatory tissue; E, layer of dentin separating pulp from region of resorption. Right: Resorption in bicuspid. A, opening into the former periodontal membrane; B, coronal portion of dentin resorbed and with bone formation; C, resorption in root portion of dentin; D, slight inflammatory reaction in pulp

vitality tests. Histologic examination of a section of the tooth showed resorption of dentin and replacement by bone. The patient later reported that the inflammation of the eye and the arthritic condition had been relieved.

Although no history is available concerning the lower second bicuspid shown in Figure 4, right, the illustration is included in this report because the crown of the tooth is still in place in spite of the extreme destruction of the root.

Figure 1, upper right, shows an upper second bicuspid which responded sharply to ice. Figure 1, lower right, shows the region twenty-two months later. The bicuspid still reacted to ice.

A woman, 30 years of age, had been under the observation of one of us (G.R.W.) since early childhood. A slight departure from normal in the roentgenographic appearance of the upper right first molar was noticed in August 1934 (Fig. 5). Two years and four months later the condition was more noticeable. In July 1939, little if any change could be detected. A roentgenogram in November 1939 did not reveal any increase in the internal resorption. In June 1941, definite evidence of resorption could be observed, but there had been no subjective symptoms. In October 1944, the patient reported that the tooth had bothered her and that a dentist had found a class 2 cavity. He opened the cavity, found "exposure of an extremely large pulp" and put a sedative cement filling in the cavity. At this time the tooth was

Fig. 7.—Left: High power magnification of specimen shown in Figure 6, left. A, pulp; B, granulation tissue; C, thin layer of dentin. Right: High power magnification of resorption in root (see Figs. 5 and 6, left). A, osteoclasts on the dentin indicate active resorption; B, osteoblasts indicate bone formation; C, pulp; D, bone laid down in place of resorbed dentin

hypersensitive to thermal shock and the lingual marginal gingiva was swollen. The tooth was removed, and microscopic sections were prepared.

Histologic Examinations

The molar shown in Figure 5 was examined microscopically. Figure 6, left, shows the crown of the tooth. Extensive resorption, progressing in an apical direction, has removed a large part of the dentin. Resorption was still in progress at the time of extraction as indicated by the presence of osteoclasts in lacunae of the

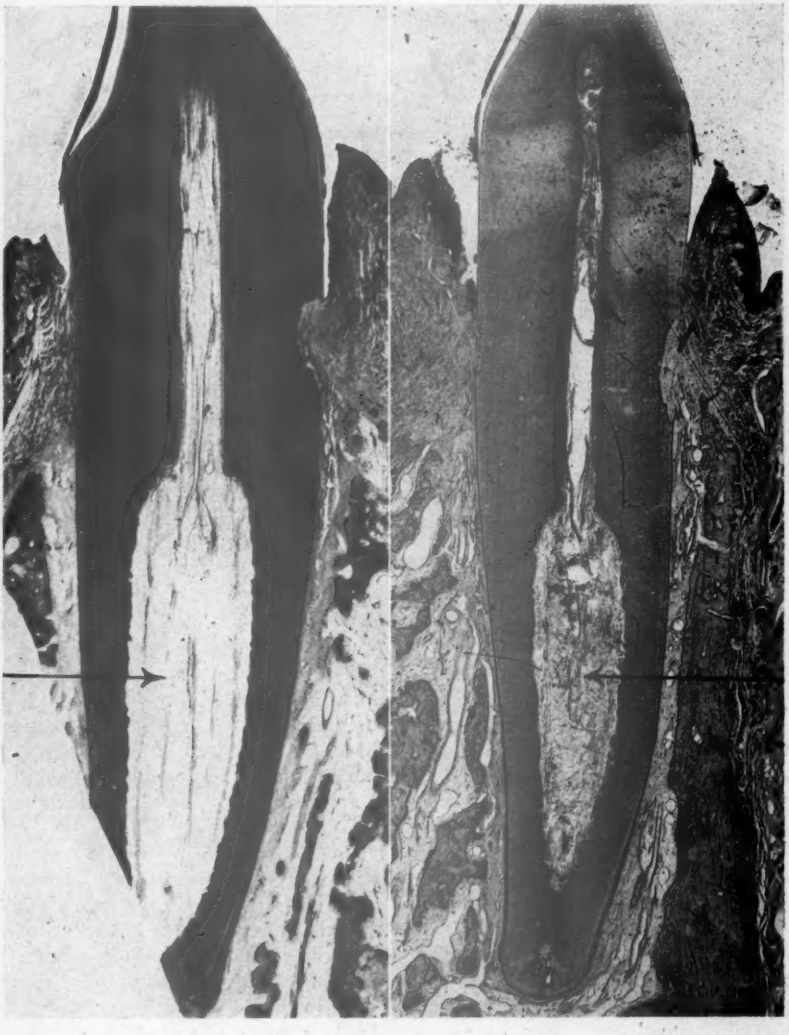


Fig. 8.—Two lower incisors of dog. Arrows point to dentinal resorption which occurred after application of 80 milliampere minutes of diathermy to the interdental papilla

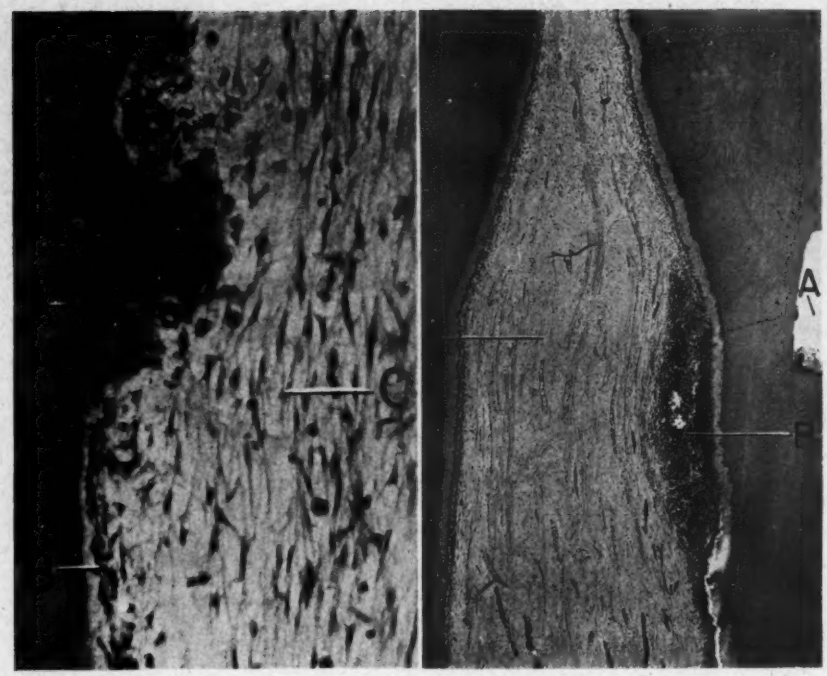


Fig. 9.—Left: High power magnification of resorption in one of teeth in Figure 8. A, dentin; B, repair by formation of hard substance; C, pulp. Right: Intact incisor. A, cavity experimentally prepared and filled with silicate cement; B, acute inflammation developed below cavity; C, remaining pulp relatively normal (specimen by courtesy of Dr. H. A. Zander, Tufts College Dental School, Boston)

dentin. However, bone formation was active at the same time as evidenced by the presence of osteoblasts (Fig. 7, right). The resorption did not expose the pulp cavity but extended parallel to the pulp, leaving an intact layer of dentin. Extensive resorption, which previously had cut into the occlusal dentin, had been repaired completely by a bonelike hard substance (Fig. 6, left).

Although serial sections were not made, the available sections did not show the pulp to be exposed at any place. The history indicated that there had been exposure of the pulp; however, the pulp chamber had not been opened by the operator. Instead, the cavity, which had been hollowed out by the resorption of dentin and was filled with proliferating connective tissue, had been opened. As a result of this mechanical trauma, acute inflammation, which was indicated by the presence of blood and pus in the granulation tissue, began (Fig. 7). Probably the same trauma is responsible for the inflammatory reaction which is localized to the pulp horn.

In this case the resorption must have started somewhere in the periodontal membrane and not in the pulp chamber. In other words, this is not true internal resorption. The pulp was more or less intact at the time of extraction, whereas the process itself had been active for at least ten years. The available microscopic sections did not reveal the opening into

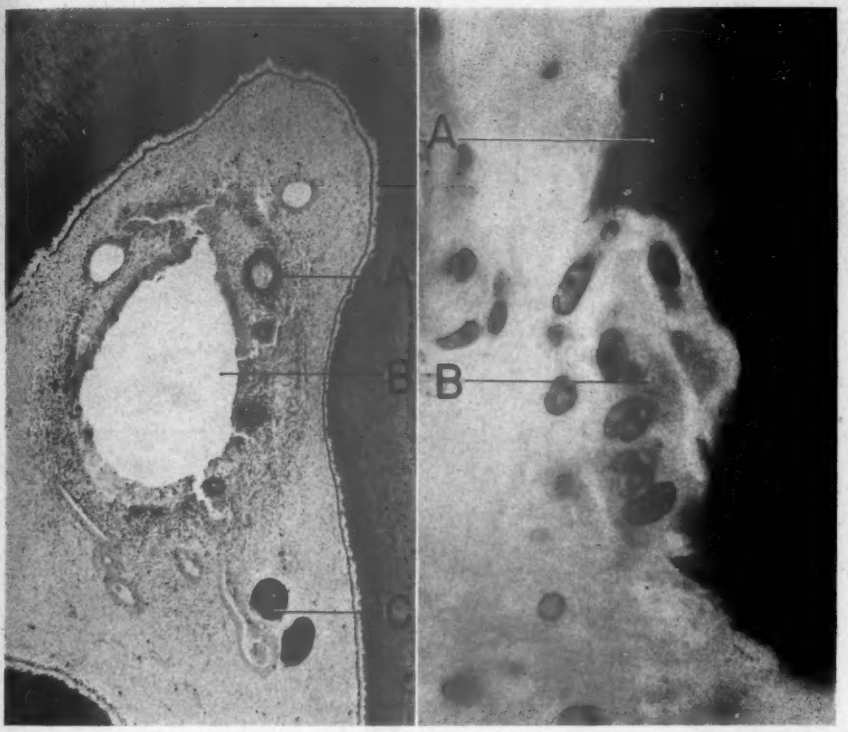


Fig. 10.—Left: Acute pulpitis with partial necrosis. A, abscess formation; B, necrotic region; C, pulpstones.[15] *Right: A, high power magnification of pulpstone; B, osteoclast in a resorption lacuna indicates active resorption*

the periodontal membrane. The primary resorption might escape detection on microscopic examination because of the technical preparation of the specimen or the direction of sectioning.

A man, 22 years of age, who complained of soreness of the gingiva in the lower right bicuspid region, was observed by one of us (B.T.R.). A bitewing roentgenogram revealed a radiolucent region suggesting a class 5 cavity (Fig. 6, right, inset). The gingiva was pushed away and the opening was enlarged with a bur, with the patient under anesthesia produced by procaine hydrochloride. The opening led into a large hole from which a drop of pus escaped. The dentist assumed that the pulp was exposed and extracted the tooth.

Histologic examination showed an unexposed pulp with only a slight inflammatory condition in the coronal portion (Fig. 6, right). Extensive resorption excavated the coronal dentin and penetrated into the dentin parallel to the pulp chamber. Bone formation and resorption alternately had taken place and were still active at the time of extraction. Bone had been laid down on the resorbed dentinal surface. In the opening to the region of resorption, blood and pus with some foreign filling material could be observed.

15. Orban, B., and Ritchey, B. T., Toothache under Conditions Simulating High Altitude Flight. *J.A.D.A.* 32:145 (February 1) 1945.

In this case, as in the preceding one, exposure of the pulp was assumed clinically; however microscopic examination did not confirm the diagnosis. This case was one of external resorption starting from the periodontal membrane. Many cases described in the literature, in which the diagnosis was internal resorption and was based on clinical observation only, belong to this category. However, there is no doubt that resorption might start within the pulp tissue.

In 1930, Gottlieb and Orban performed investigations on the root canals of dogs to determine the action of diathermy.[16, 17] In one animal the electrode was placed on the gingival papilla between two incisors, and diathermy was applied for 80 milliampere minutes. Five days later a wound was observed on the papilla. The dog was killed one month later.

The labiolingual sections of these incisors are shown in Figure 8. In the apical

16. Gottlieb, B., and Orban, B., Veränderungen im Periodontium nach Chirurgischer Diathermie. *Ztschr. f. Stomatol.* 28:1208, 1930.

17. Orban, B., Entwicklungsgeschichte und Histogenese. *Fortschr. d. Zahnh.* 8:699, 1932.

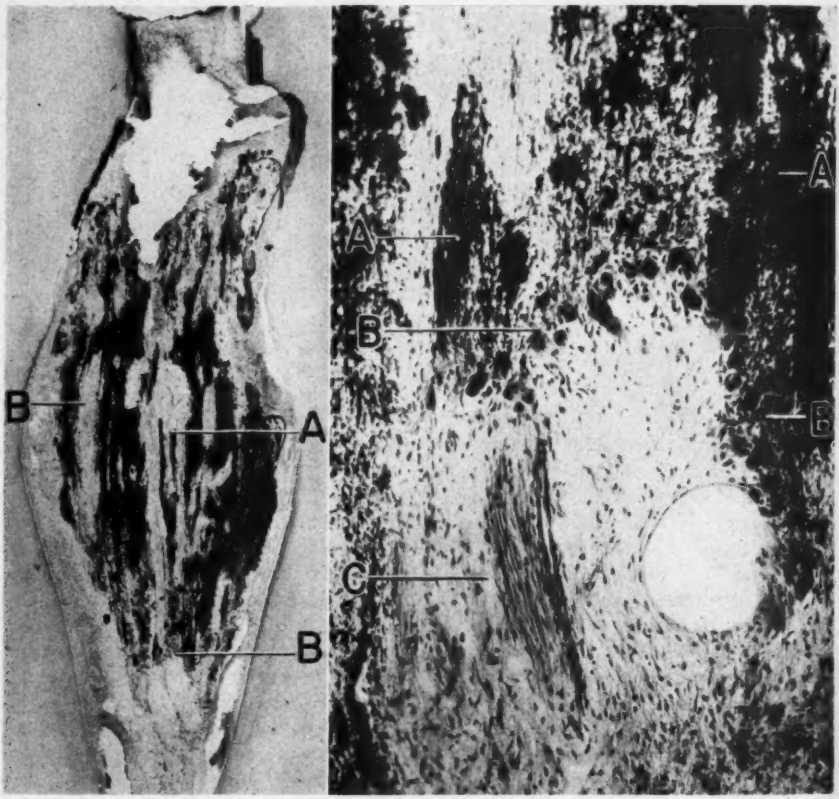


Fig. 11.—Left: Acute pulpitis. A, amorphous calcification of the pulp; B, extensive osteoclastic resorption. Right: High magnification of osteoclastic resorption of amorphous calcifications in pulp. A, calcified masses; B, osteoclasts; C, pulp

Fig. 12.—A, Caries of molar; B, penetration through regular dentin; C, extending also into irregular dentin; D, abscess in one pulp horn; E, inflammation in remainder of pulp. At x baylike depressions in the irregular dentin

half of the tooth the pulp canal is considerably widened by osteoclastic resorption. The pulp in the widened apical half is hyperemic and contains some migrating phagocytes and lymphocytes. The rest of the pulp is normal with the exception of some hemorrhage. The dentin shows signs of former resorption but, at the time of death, repair by the formation of a hard substance was in progress (Fig. 9, left). These two teeth also show slight resorption of the labial root surface below the epithelial attachment, most probably as the result of the diathermy.

The damaging effect of diathermy has been observed in the periodontal membrane of teeth, the pulp of which had been treated experimentally with diathermy. Far reaching necrosis, which was followed by secondary calcifications and ankylosis between alveolar bone and teeth, has been reported.[16, 18]

Resorption in the pulp often can be observed in the presence of pulpitis of different degrees and origins. In a microscopic specimen showing acute pulpitis

18. Orban, B., Gewebsveränderungen im Periodontium nach chirurgischer Diathermie. *Zschr. f. Stomatol.* 31:1154, 1933.

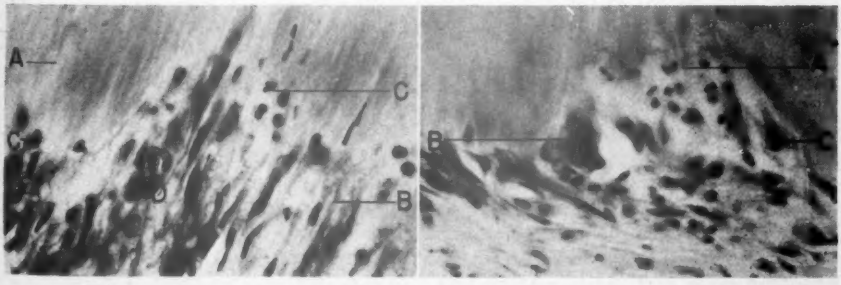


Fig. 13.—High power magnification of one of baylike depressions shown in Figure 12. Left: A, dentin; B, odontoblasts; C, leukocytes (some eosinophils); D, large nuclei of mesenchymal cells between odontoblasts. Right: A, irregularly bounded lacuna harboring several leukocytes and two giant cells, (B) one large, (C) another smaller

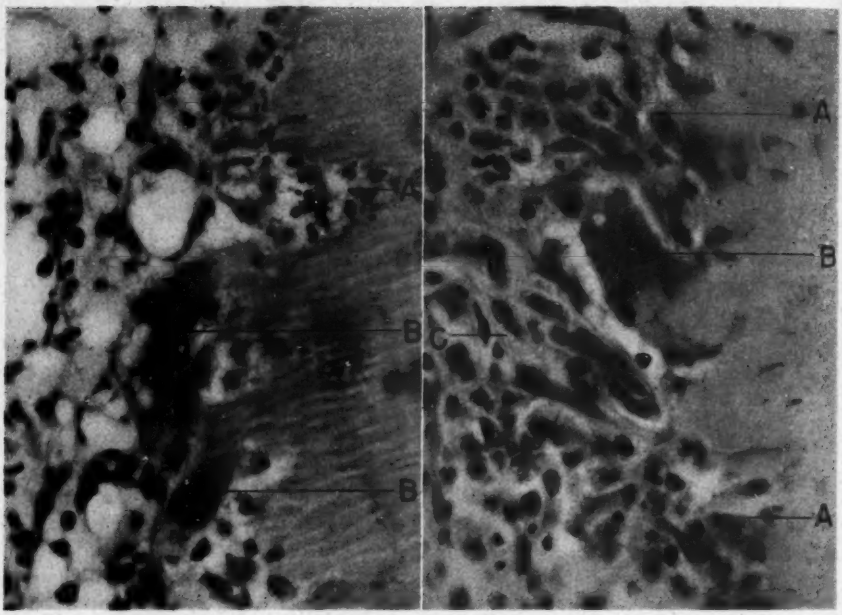


Fig. 14.—High power magnification of tooth shown in Figure 9, right. Left: A, baylike depression in dentin with many leukocytes; B, giant cells along irregular dentinal wall. Right: A, baylike depression in dentin with leukocytes; B, giant cell; C, inflammation in pulp

with partial necrosis and abscess formation in the pulp, several pulpstones can be observed (Fig. 10). On the surface of these pulpstones osteoclasts in shallow lacunae are seen, proving that active resorption was in progress.

In another specimen showing acute pulpitis with extensive amorphous calcification of the pulp, numerous osteoclasts resorbing the calcified masses can be observed (Fig. 11).

Figure 12 shows a carious process that had penetrated through the regular dentin of the occlusal surface of a molar, reaching into the thick layer of irregular dentin. In one pulp horn in which bacteria had reached the pulp, an abscess had formed. In several regions along the irregular dentin, small baylike depressions can be seen. In one of these the odontoblasts are somewhat deranged (Fig. 13, left). Neutrophil and eosinophil leukocytes can be seen between the odontoblasts as well as in the dentinal tubules. The odontoblasts show many small vacuoles and intercellular edema. Between the odontoblasts some large nuclei, which differ markedly from the nuclei of odontoblasts, can be seen. These nuclei are larger and lighter and show chromatin granules as well as nucleoli, while the odontoblasts are smaller and more compact. In the irregularly bounded lacuna of Figure 13, right, many neutrophil leukocytes and two typical osteoclastic giant cells are seen.

The sequence of events in this tooth might be reconstructed as follows: Bacterial toxins led to degeneration of odontoblasts in restricted regions and to necrosis of parts of the dentin. Leukocytes were attracted by the disintegrating cells, and giant cells (osteoclasts) differentiated in response to the foreign body stimulus

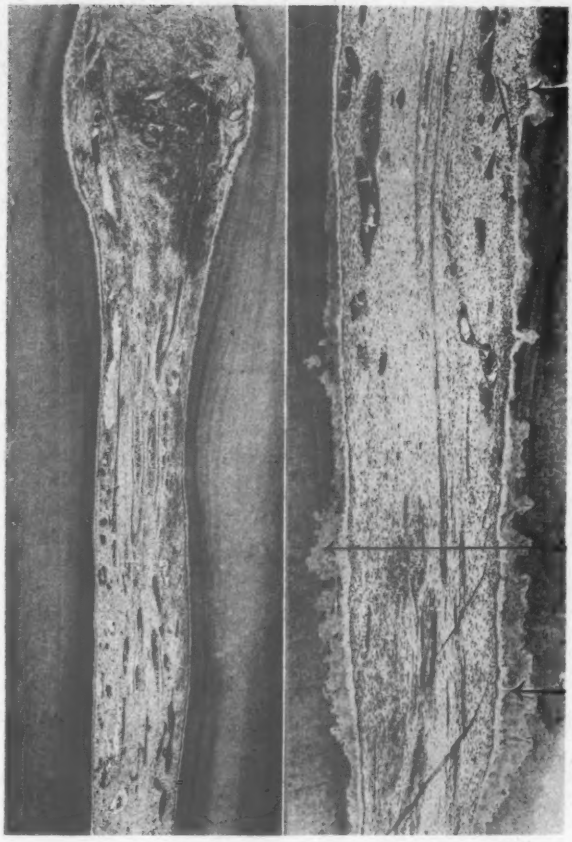


Fig. 15.—Total pulpitis.[15] Left: Coronal part. Right: Apical part. Arrows point to numerous repaired resorptions

arising in the necrotic dentin. Whether the giant cells alone are responsible for the resorption of dentin or whether the leukocytes also played an active part cannot be decided. Since leukocytes produce a proteolytic enzyme, destruction of dentin by leukocytes is at least not impossible.

A similar finding could be made in a tooth in which a cavity was filled with silicate cement (Fig. 9, right). The irritation produced by the silicate cement caused acute inflammation of the pulp, corresponding to the floor of the cavity. At the edges of the inflammatory reaction giant cells developed between inflammatory cells and in close proximity to odontoblasts and dentin (Fig. 14). A large number of leukocytes, some in small baylike depressions of the dentin, are present. Similar giant cell formation and accumulation of leukocytes could be seen in several different cases in which silicate fillings were placed in cavities cut into intact human teeth.

In a case of total pulpitis in an incisor with old silicate cement fillings, resorption can be seen in the apical third of

the root canal (Fig. 15). Resorption must have occurred some time previous to extraction because microscopic examination reveals repair by apposition of a hard substance. This tissue is not bone or a bonelike substance but *dentin*. This finding apparently has not been reported previously in the literature.

First, a layer of irregular dentin had been laid down, then regular dentinal tubules with globular calcification of the matrix and then an uncalcified predentin layer which is lined by odontoblasts (Fig. 16). The pulp, even in the region of repair, shows signs of acute inflammation in the presence of leukocytes. In most other cases of internal or external resorption of teeth, the repair occurs by deposition of bone or a substance which combines features of bone, cementum and dentin. It is often referred to as osteodentin but is difficult to classify exactly.

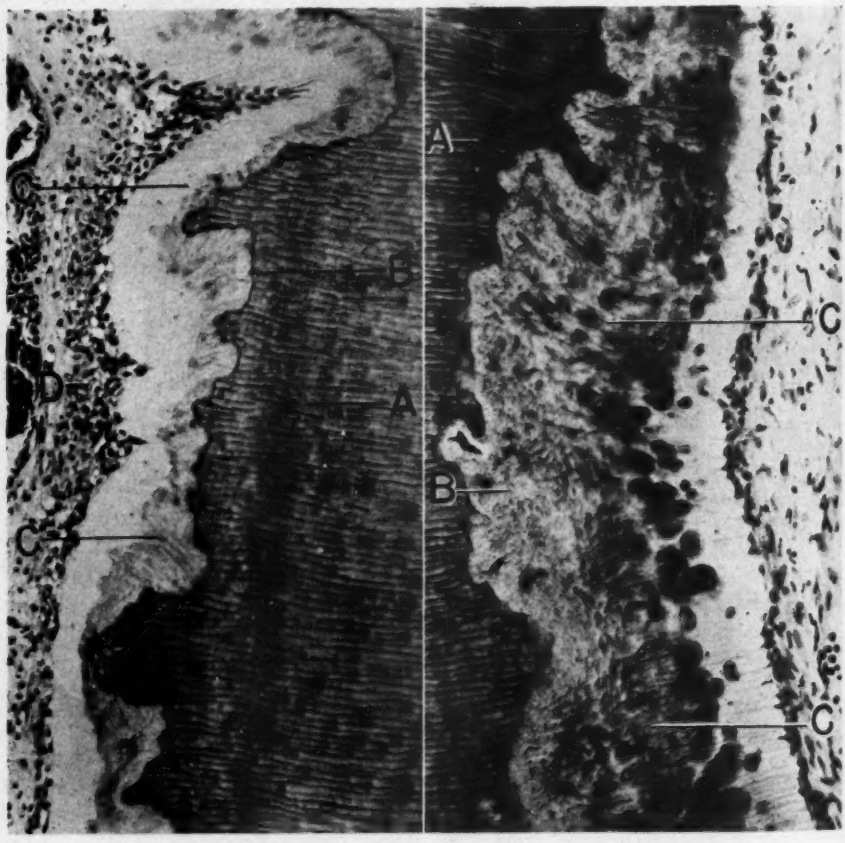


Fig. 16.—High power magnification of resorption in Figure 15. Left: A, dentin shows sharp resorption line; B, new hard tissue laid down on resorbed dentin is dentin; C, dentinal tubules; D, pulp. Right: A, resorbed dentin is first replaced with (B) irregular and then (C) more regular dentin

Discussion

On the basis of our clinical, roentgenographic and histopathologic observations, we can confirm former statements that both external and internal resorption of teeth occur. As examples of true internal resorption, we can accept only those cases in which the resorption starts in the pulp chamber. This diagnosis can be made only by microscopic examination. Many cases diagnosed as internal resorption are in fact cases of external resorption starting from an undetected point at the periodontal surface of the root.

In view of the findings in 2 cases described in this paper (Figs. 5-7), it might be possible to make a correct clinical diagnosis in similar cases and thus attempt conservative treatment.

Internal resorption was said to start by metaplasia of the pulp. The differentiation of giant cells in the pulp is, however, not proof of metaplasia. Giant cells and osteoclasts can develop in every connective tissue in which undifferentiated mesenchymal cells are present, and this cell type is present in the dental pulp. Osteoclasts or osteoblasts may differentiate if the stimulus necessary for their formation is present. This stimulus might be exerted by some toxic material.

Even in the case of the diathermy experiment a toxic influence might be assumed. The high frequency current might have brought about degenerative changes in pulp and dentin, as it definitely did in the periodontal membrane, and thus produced the necessary toxic influence.

In repair of resorbed dentin by new dentin, metaplasia is definitely excluded (Figs. 15 and 16). In this case the odontoblasts had disappeared and osteoclasts had differentiated. The osteoclasts resorbed the dentin; definite and large lacunae can be seen. After the cause for resorption subsided, the osteoclasts disappeared, connective tissue bordered the resorbed surface and formation of a hard substance began. This hard substance first was irregular and difficult to define, but soon odontoblasts appeared and their protoplasmic processes have been incorporated into the newly formed hard substance, thus characterizing the hard tissue as dentin.

Conclusions

1. So-called internal as well as external resorption of teeth can occur.

2. Metaplasia of the pulp is not necessary to explain resorptive processes. Osteoclasts can develop in inflamed pulps, most probably as a result of toxic influences.

3. Resorbed dentin most frequently is repaired by bone or a bonelike substance, but dentin also might be produced by odontoblasts differentiated from undifferentiated connective tissue elements.

Public Aid Costs.—The Department of Public Assistance of Pennsylvania recently reported that a study of living costs for individuals and families receiving public assistance showed that the average cost of minimum requirements for an adult male living alone totals $33.80 per month. The requirements for a typical two-person case, consisting of a mother and her 10-year-old child, total $60; a family of four persons, consisting of a disabled father, mother and two children, requires $103 per month, and requirements for a mother and seven small children amount to approximately $160.40.—*Current Living Costs as Related to Standards of Public Assistance in Pennsylvania, December 1945. Commonwealth of Pennsylvania, Department of Public Assistance, Harrisburg, Pa., May 2, 1946, p. 31.*

A CAUSE OF DELAYED HEMORRHAGE AFTER TOOTH EXTRACTION

Gustav William Rapp, Ph.D., Chicago

THE problem of delayed hemorrhage after tooth extraction or other oral surgical operations has plagued the dental practitioner for a long time. This type of hemorrhage presents itself up to two or three days after the operative procedure, which in most instances appears to be uneventful. It occurs occasionally even when seemingly adequate preoperative medication with such substances as vitamin K, vitamin D and calcium and phosphate has been instigated. The method of preventing hemorrhage now seems to be known, but it was only through the coincidence of a long and apparently unrelated series of events that the solution to this perplexing and annoying problem became obvious.

Physiology

The simplest and perhaps most nearly correct way of explaining the sequence of events in the clotting of blood is illustrated in the accompanying diagram.

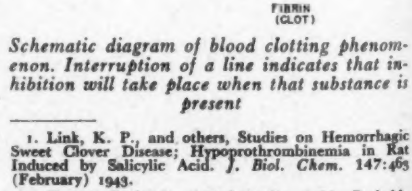
Vitamin K normally stimulates the formation of an adequate quantity of prothrombin, which circulates in the normal blood stream. Under ordinary conditions when blood is not shed or when tissues are not injured, heparin, prepared by the liver and also circulating in the blood, prevents an activation of prothrombin by calcium ions to form thrombin. However, when platelets are ruptured, cephalin is released. Cephalin, having an extreme affinity for heparin, removes the check from prothrombin, which can now react with calcium ions to become thrombin, the enzyme which acts on fibrinogen to form the blood clot.

It can be seen that blood deficient in prothombin will clot slowly; therefore bleeding will be prolonged and a fragile clot will be produced.

Hypoprothrombinemia

During their studies on the hemorrhagic sweet clover disease in cattle, Link and his associates[1] discovered that dicoumarin, a substance in the clover, lowered the prothrombin content of the blood, thus precipitating the fatal hemorrhage. They showed subsequently that dicoumarin is changed by the body into salicylic acid and that it is this latter substance which causes hypoprothrombinemia.

Singer,[2] of Vienna, who joined the U.S. Army Medical Corps, made the remarkable observation that the high incidence of hemorrhage following tonsillectomy in America as contrasted to the



Schematic diagram of blood clotting phenomenon. Interruption of a line indicates that inhibition will take place when that substance is present

From the Department of Research, Chicago College of Dental Surgery, Loyola University.

1. Link, K. P., and others, Studies on Hemorrhagic Sweet Clover Disease; Hypoprothrombinemia in Rat Induced by Salicylic Acid. *J. Biol. Chem.* 147:463 (February) 1943.

2. Singer, Rudolph, Acetylsalicylic Acid, Probable Cause for Secondary Post-Tonsillectomy Hemorrhage; Preliminary Report. *Arch. Otolaryng.* 42:19 (July) 1945.

relatively low incidence in Europe could be ascribed to the fact that the European postoperative analgesic is almost always aminopyrine (Pyramidon) while in America the choice is acetylsalicylic acid (aspirin) alone or in combination with other drugs.

It was now possible to show that acetylsalicylic acid is capable of producing hypoprothrombinemia in human beings[3] and that this suppression of an adequate prothrombin content is reversible by the administration of menadione, a synthetic substance possessing vitamin K activity.[4] This concomitant acetylsalicylic acid and vitamin K therapy seems to have no effect on the analgesic activity of acetylsalicylic acid.[5]

The purpose of this paper is to present three observations which were made as a result of my studies. First, an analgesic preparation of a type prescribed by many dental practitioners, consisting of acetylsalicylic acid, acetophenetidin and caffeine citrate (commonly referred to as APC tablets, Empirin compound or Anacin[6]), causes hypoprothrombinemia in normal human beings. Second, hypoprothrombinemia caused in this way is preventable by the administration of adequate doses of synthetic vitamin K. Third, case records indicate that the incidence of delayed postextraction hemorrhages is directly related to the acetylsalicylic acid and vitamin K intake of patients.

Results of Studies

In order to determine whether the mixture of acetylsalicylic acid, acetophenetidin and caffeine citrate produces hypoprothrombinemia, 40 apparently normal students were separated into four groups of 10 each and given the following medications for two successive days (Table 1):

Group A: Eight tablets each containing 250 mg. of acetylsalicylic acid, 160 mg. of acetophenetidin and 20 mg. of caffeine citrate, one tablet being taken every hour.

Group B: Eight similar tablets, two being taken every four hours.

Group C: Eight similar tablets and eight tablets containing 1 mg. of menadione (synthetic vitamin K), one of each being taken at two hour intervals.

Group D: Same as group C, two tablets of each being taken every four hours.

New and Nonofficial Remedies, 1946,[7] states that the dose of menadione "should not exceed 2 mg. a day and should not be continued at 2 mg. a day for a period exceeding four weeks," the inference being that larger doses could be toxic. A larger daily dose could lead to hyperprothrombinemia which, in turn, might predispose the patient to thrombosis. However, this chain of events is not likely in combined therapy such as that used in these studies, since the menadione must overcome the hypoprothrombinemia produced by the salicylates. It is, of course, assumed that both drugs are absorbed and produce their effects at comparable rates in all persons. This important point is now under investigation.

Pharmacologically speaking, medicaments containing acetylsalicylic acid should be given at intervals of two hours instead of twice the dose at four hour intervals. However, since most practitioners still prescribe in the second way, the tests for Groups A and B were both necessary.

Just before and at one day intervals for six days after the administration of the first test substances, determinations

3. Meyer, O. O., and Howard, B., Production of Hypoprothrombinemia and Hypocoagulability of Blood with Salicylates. *Proc. Soc. Exper. Biol. & Med.* 53:934 (June) 1943.

4. Neivert, H., Late Secondary Tonsillar Hemorrhage; Studies of Prothrombin and Vitamin K. *Arch. Otolaryng.* 42:14 (July) 1945.

5. William, R. G., Personal communication to the author.

6. None of these products is accepted by the Council on Dental Therapeutics of the American Dental Association.

7. *New and Nonofficial Remedies, 1946.* Chicago: American Medical Association, 1946.

Table 1.—Effects of menadione and a mixture of acetylsalicylic acid, acetophenetidin and caffeine citrate on prothrombin time

Day*	Group A, prothrombin†		Group B, prothrombin		Group C, prothrombin		Group D, prothrombin	
	Seconds	Per cent	Seconds	Per cent	Seconds	Per cent	Seconds	Per cent
1	18±1.2	109	19±1.3	103	19±1.5	103	19±1.8	103
2	19	103	19	103	19	103	18	109
3	33	60	34	58	18	109	17	115
4	28	73	30	66	18	109	18	109
5	25	79	26	76	19	103	19	103
6	25	79	24	82	18	109	19	103

*Medications were administered only on the first and second days.
†Prothrombin time in seconds and percentage of normal.

of prothrombin time[8] were made on all subjects. From these determinations the prothrombin concentrations in percentage of the usual value were calculated. It must be realized that there is a linear agreement between the prothrombin time and clotting time of blood. The average prothrombin time for this series of test subjects was 19.65±1.2 seconds. This value was considered as 100 per cent. An inverse linear relation between the prothrombin-clotting time and the prothrombin content was assumed.[9]

It is of interest to note that the two methods of administering the mixture containing acetylsalicylic acid, acetophenetidin and caffeine citrate were equally effective in causing hypoprothrombinemia. It is equally significant that hypoprothrombinemia did not occur in those patients to whom menadione was administered.

I also inspected the dental records of a relatively large group of persons who had been receiving experimental quantities of menadione as a medication accompanied by a suitable control group who received no menadione (Table 2, Groups 1, 2 and 3). Since all were inmates of an institution, their preoperative and postoperative care was identical. The postoperative medication consisted of two of the previously described analgesic tablets every four hours, sixteen tablets in all. Complete dental records and biweekly determinations of prothrombin time were available.

Another institution which used only aminopyrine for postoperative analgesia allowed the perusal of its clinical records (Table 2, Group 4).

Finally, a so-called mixed control was obtained by inspection of the clinical records of the dental clinic at Loyola University (Table 2, Group 5). It may be assumed that a considerable number of these patients, who were selected because no postoperative medication was definitely prescribed, had used home remedies of their own choice or through advertising insistence. Some of these self-administered medications most certainly had contained acetylsalicylic acid in one form or another.

In the compilations for Table 2, the extraction of more than one tooth at one time was considered a single operation.

Comment

Although it may be argued that the number of cases is not sufficient to war-

8. Page, R. C.; De Beer, E. J., and Orr, M. L., Prothrombin Studies Using Russell Viper Venom; Relation of Clotting Time to Prothrombin Concentration in Human Plasma. *J. Lab. & Clin. Med.* 27:197 (November) 1941.

9. Fullerton, H. W., Estimation of Prothrombin; Simplified Method. *Lancet* 2:195 (August 17) 1940.

Table 2.—Incidence of hemorrhage after tooth extraction

Group	Cases	Postoperative medication	Menadione, mg. daily	Prothrombin time, seconds	Postoperative hemorrhages	
					Number	Per cent
1	132	Analgesic tablets,* 2 every 4 hr. (total 16)	0	19±3† 34±4‡	18	13.6
2	112	Same as Group 1	3	18±2† 23±4‡	5	4.5
3	127	Same as Group 1	6	17±2† 19±1‡	2	1.6
4	90	300 mg. aminopyrine every 4 hr.	0	No data	1	1.1
5	200	No data	**	No data	7	3.5

*Acetylsalicylic acid, 250 mg.; acetophenetidin, 160 mg.; caffeine citrate, 20 mg.
†One day preoperatively.
‡Three days postoperatively.
**It is presumed that no menadione was administered.

rant definite conclusions, the data are unequivocal in demonstrating that (1) patients with a prolonged prothrombin time can be expected to have postoperative hemorrhages; (2) the administration of the mixture containing acetylsalicylic acid, acetophenetidin and caffeine citrate for postoperative analgesia produces hypoprothrombinemia, and (3) this hypoprothrombinemia is not found when menadione is administered. Concurrently with the absence of hypoprothrombinemia there is a relative infrequency of delayed postoperative bleeding.

It seems likely that those patients who have prolonged bleeding time when they present themselves for oral surgical operations may have consumed acetylsalicylic acid in some form and thereby produced hypoprothrombinemia. This condition should be amenable to vitamin K therapy.

Conclusions

1. Acute hypoprothrombinemia can be produced in normal human beings by the ingestion of a mixture which contains acetylsalicylic acid.

2. This hypoprothrombinemia becomes evident one and a half to two days after ingestion of acetylsalicylic acid.

3. The clotting time in these cases is nearly double the usual time.

4. Hypoprothrombinemia caused by ingestion of acetylsalicylic acid persists for longer than five days.

5. The hypoprothrombinemia is preventable by ingestion of 1 or 2 mg. of menadione with each analgesic tablet containing acetylsalicylic acid.

6. It may be assumed that hypoprothrombinemia already existing as a result of acetylsalicylic acid therapy can be corrected with the proper dosage of synthetic vitamin K.—*1757 West Harrison Street.*

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LON W. MORREY, D.D.S., *Editor*

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EDITORIALS

THE ARMY RETRIEVES ITS BONE: CHANGES IN ARMY REGULATIONS

DURING the entire war, dental officers in the Army were compelled to work under regulations that represent nothing less than the gross maladministration of a vital health service. These regulations were established by the Medical Department of the Army and obviously had the tacit approval of regular Army Dental Corps officers who either did not know or ignored their responsibility to their own profession. Even when this maladministration approached the stature of a national scandal and dental officers of every rank openly stated that it gravely impaired the effectiveness of the Army Dental Corps in a time of war, the "brass hats" of the Medical Department and of the Army Dental Corps were unwilling to move directly for correction. Every strategy was used by these past masters of delay and reaction to prevent a corrective change in dangerously outmoded and openly discriminatory regulations. Every tactic of the professional patriot was used to prevent action on the grounds that the country was fighting a war.

The American Dental Association, while recognizing the universal testimony on the inadequacy of existing regulations, was unwilling to take any legislative action which might interfere with the successful prosecution of the war. It sought first to bring about the necessary improvements through a revision of the regulations. When this effort was not productive, legislation was prepared.

Under this threat of legislative correction, Maj. Gen. Robert H. Mills, who was then Chief of the Dental Division, issued a statement which indicated his opposition to legislation and expressed the reluctant hope that he could secure essential revisions in the regulations. In expressing his opposition to legislation, General Mills, for once, was able to take an unequivocal stand[1]:

1. Association Activities. *J.A.D.A.* 32:489 (April 1) 1945.

It is my opinion that legislation is not essential or even desirable. . . . General Kirk (the Army Surgeon General) is fully cognizant of the administrative problems in some of the lower echelons of command, and accordingly plans for a change in Army regulations are now under way. It is believed that the proposed change in Army Regulations, if approved, will accomplish more over a period of time than if forceful legislative methods are employed.

Two days after the first atomic bomb had been dropped on Hiroshima and the collapse of Japan was imminent, the Army finally issued revised regulations (A.R. 40-15) on August 8, 1945. This was three months to the day after the war in Europe had ended. The Army had finally thrown its bone to the dental officers and to the dental profession.

By no means did this revision of regulations correct all of the basic defects. Only a minimum of concessions was made by the Army in an effort to redeem some of its long overdue promises. Real advances in the administration of the Army Dental Corps apparently were not desired and they were not made.

The Army has now retrieved its bone.

The administrative concessions, forced on the Army by growing congressional, public and professional opinion, have been withdrawn in new regulations (A.R. 40-15) issued on August 23, 1946. No official notice of such action was given to dental officers or to the dental profession. The officials of the Army Dental Corps did not know or, at least, did not openly protest the changes which even went to the length of changing the title of the chief administrative officer of the Dental Corps from "Director, Dental Division" to "Chief, Dental Consultants Division." Other changes were more damaging as the following comparisons will show:

Regulations of August 8, 1945

Administration.—a. Matters relating to the dental service as a whole are administered *by the Director, Dental Division,* as assistant to the Surgeon General, through The Surgeon General.

b. In a theater, service command, or any other headquarters, matters relating to the dental service are administered by the dental surgeon, *through the surgeon.*

Regulations of August 23, 1946

Administration.—a. Matters relating to the dental service as a whole are administered *under the direction of* The Surgeon General by the Chief, Dental Consultants Division, an assistant to the Surgeon General.

b. In a theater, army or any other headquarters, matters relating to the dental service are administered by the dental surgeon, *under the direction of the surgeon.*

Regulations of August 8, 1945

Duties of Dental Officers. . . . To route all recommendations or communications originated by him through the surgeon who *will forward* them with appropriate recommendations or remarks.

Regulations of August 23, 1946

Duties of Dental Officers. . . . To route all recommendations or communications originated by him *to the surgeon who will take appropriate action.*

These parallels could be multiplied but only to demonstrate the failure of the Army to keep faith with past promises, a thoroughgoing contempt for the service rendered to the nation by dental officers and the complete incompetence of present high Army officials even to imagine a just and reasonable program of administration for dental officers. If more evidence of the need for courageous and able administration in the Army Medical Department and Army Dental Corps is wanted, this secret recalling of corrective regulations for publicly admitted failures should provide it.

The remedies for the situation are clear. Dentistry must ask immediately for a larger voice in the selection of the Surgeon General and Dental Corps officials. For too long a time these appointments have been permitted to be the subject of Army ritual and reaction. Dentistry must man the Army Dental Corps with officials and personnel who are able to envision at least the basic problems of their profession and their duty of rendering a health service to the persons under their charge. Dentistry must use all of its resources to make impossible again such utterly highhanded and arbitrary management of professional affairs. Dentistry must enlist the aid of Congress, which, through investigation and legislation, can prove that there is authority superior to that of the Army hierarchy.

To these tasks, the American Dental Association will lend all of its facilities. The cause is a just one, and the facts surrounding it are inescapable. Vigorous presentations should be made at once to Congress for immediate action.

JOINT CONFERENCE ON DENTISTRY FOR CHILDREN

TWENTY years ago the American Society for the Promotion of Dentistry for Children was organized by thirteen forward looking members of the American Dental Association. Despite the apathy and indifference shown by most of the profession, the Society has grown to a membership of approximately one thousand.

During its first year, the Society surveyed existing courses in pedodontics. The survey disclosed that only seven schools provided lectures on this subject. By 1932, the number had grown to twenty-nine and by 1935 it had reached a total of thirty-eight. Shortly thereafter, all dental schools included some special instruction on pedodontics. Since 1942, this has been one of the subjects recommended by the Council on Dental Education for inclusion in the dental curriculum.

The increased number of undergraduate courses in pedodontics is attributable in no small degree to the stimulation provided by the American Society for the Promotion of Dentistry for Children, now known as the American Society of Dentistry for Children. Despite the Society's efforts, the provision of better dental care for children remains an unsolved problem. Although undergraduate training in pedodontics is required, obviously more than this is needed to stimulate further specialization in dentistry for children.

On February 9, 1947, the Council on Dental Health of the American Dental Association and the American Society of Dentistry for Children jointly sponsored a conference on dental service for children. Out of that meeting came a recommendation for study to determine the most acceptable way to expand the present program for dental care.

The February 9 conference marks another milestone in the improvement of dentistry for children. It points the way toward a better understanding and eventually the solution of this problem. It is hoped that this first joint conference will result in future conferences on national, state and community levels.

A. D. A. AFFAIRS

HOTEL ROOMS FOR BOSTON MAY BE RESERVED AFTER APRIL 15

The lack of hotel rooms for the eighty-eighth annual meeting of the American Dental Association, to be held August 4-8 in Boston, makes it imperative that those planning to attend apply only for rooms which they are reasonably sure of using, John J. Hollister, business manager of the American Dental Association, has announced.

Very few single rooms are available and will be assigned only in exceptional cases, Mr. Hollister said. All hotel reservations for the meeting must be made through the Boston Convention Bureau. The Convention Bureau will not accept requests for reservations before April 15.

A coupon to be mailed to the Boston Convention Bureau indicating hotel preferences appears on pages A-22 and A-23 of this issue of THE JOURNAL, together with a listing of Boston hotels. This form must be used in applying for reservations.

Reservations will be made when the coupon is received by the Bureau. All reservations will be subject to reconfirmation by the holder a month before the date of the meeting. The responsibility for reconfirmation of rooms is on the holder, and the reservation will be subject to cancellation by the Convention Bureau if not reconfirmed.

A card will be mailed by the Convention Bureau to all holders of hotel reservations sometime in late June or early July. The card must be filled out indicating whether the reservation will be used as made, whether the reservation should be changed as to type or date of arrival or whether it should be cancelled. Failure to return the card within ten days may result in cancellation of the reservation, at the option of the Convention Bureau.

Dentists are asked to classify themselves when applying for a hotel reservation, as to whether they are delegates or exhibitors or hold other positions. Arrangements to house delegates, officers, trustees, committee chairmen and other officials in the Hotel Statler, headquarters hotel for the meeting, will be made by the Convention Bureau. It is hoped to provide sufficient rooms in the headquarters hotel for all official delegates.

The scientific meeting will be held in Mechanics Hall. The House of Delegates and the Board of Trustees will hold their sessions in the Hotel Statler.

SCIENTIFIC, HEALTH EXHIBITS INVITED FOR ANNUAL MEETING

The Committee on Scientific and Health Exhibits of the American Dental Association has invited dentists and dental and other scientific organizations to present exhibits at the 1947 annual meeting of the American Dental Association, August 4-8, in Boston.

This convention will be the first full scale scientific meeting held by the American Dental Association since 1941, so the committee expects an unusual number of excellent exhibits.

Exhibits will be entered in one of three possible classes. Class A exhibits consist of the presentations of original and individual investigations. These exhibits will be judged on the basis of originality and excellence of presentation.

Class B exhibits do not necessarily represent purely original research or scientific study but do represent originality in the correlation of facts and the improvement of technics which will aid the practitioner. These exhibits are judged on their value to the profession and on the excellence of their presentation.

Exhibits in Class C consist of health educational projects, which are judged on their subject matter and on the quality of presentation.

The American Dental Association will present a certificate of award to the winners of first, second and third place in each of the three classes.

RESEARCH COMMISSION HIRES ADDITIONAL STAFF ASSOCIATE

The Research Commission of the American Dental Association has employed an additional research associate to replace Mr. John R. Beall, Daniel F. Lynch, secretary of the Commission, has announced.

The new associate, Mr. Denton Smith, has a degree in chemical engineering from Michigan State College and a degree in metallurgy from the University of Michigan. He started work March 15.

CHRISTMAS SEAL RECEIPTS TOP LAST YEAR'S LEVEL

Receipts from the annual sale of Christmas Seals for the Relief Fund of the American Dental Association have topped last year's total of the same date, with returns still incomplete.

The total on February 28 was $44,672, as compared with $42,880 on February 28, 1946. Any dentist who has not yet contributed to the Relief Fund by purchasing the seals is urged to do so at once in the envelope accompanying the seals.

Send the contribution to the Relief Fund, American Dental Association, 222 East Superior St., Chicago 11.

REPORTS ASKED ON PROPOSED REVISION OF CONSTITUTION

Percy T. Phillips, New York, chairman of the Committee on Constitutional and Administrative Bylaws of the American Dental Association, has requested that state dental societies report observations and recommendations on the proposed revision of the Constitution and Bylaws to the committee as early as possible.

Dr. Phillips said that few constituent societies offered suggestions on the proposed revision at the open hearing conducted by the committee in Chicago during the meeting of the Board of Trustees. He has asked for reports from all interested groups as soon as possible so that the revision will be ready to submit at the Boston meeting of the American Dental Association.

TRUSTEES ADOPT RESOLUTION ON DEATH OF H. EDMUND FRIESELL

The Board of Trustees of the American Dental Association, at its February meeting, adopted a resolution on the death of the late H. Edmund Friesell, dean, School of Dentistry, University of Pittsburgh.

Dr. Friesell, a past president of the American Dental Association, died October 27, 1946. The text of the preamble and resolution adopted by the Board of Trustees follows.

Dr. Friesell was born in Pittsburgh, November 10, 1873, and received his preliminary education in the public and high schools of Pittsburgh. He was graduated from the Pennsylvania College of Dental Surgery in Pittsburgh in 1895 and took the degree of Bachelor of Science from the University of Pittsburgh in 1913.

Forty-three years ago he became professor of operative dentistry and dean of the School of Dentistry, University of Pittsburgh, positions he held until his death. From 1906 till 1917 he also served as professor of operative dentistry and dental pathology at Western Reserve University in Cleveland. He held honorary degrees from Marquette University and the University of Pittsburgh.

For most of his professional life he was an active worker in all of the fields of dentistry. At one time or other he served as president of the foremost dental organizations and dental educational groups. His name has appeared on many a research project as author or co-author and on the masthead of several

of dentistry's outstanding periodicals as editor or contributing editor.

He was also one of the founders and organizers of the Psi Omega Fraternity of which he was one of the most influential members.

Among his affiliations are the National Dental Association (now the American Dental Association) of which he was president in 1920-1921, National Association of Dental Faculties, American College of Dentists, American Academy of Dental Surgeons, American Institute of Dental Teachers, Pennsylvania State Dental Society, American Association of Dental Schools, International Association for Dental Research, *Fédération Dentaire Internationale*, Odontological Society of Western Pennsylvania, Omicron Kappa Upsilon, Omicron Kappa Delta, Delta Tau Delta, Psi Omega, Scabbard and Blade, and Trowel Fraternity. He was a Thirty-Second Degree Mason and a member of the United Presbyterian Church.

It was in the field of educational administration, however, that Dr. Friesell made his greatest contribution to dentistry. In his years as dean of the School of Dentistry of the University of Pittsburgh, a position which he had held since 1904, he immeasurably influenced the theory and practice of dental education during the years when it was making its greatest strides.

Dr. Friesell is survived by two daughters, Mrs. R. S. Williams, Columbus, Ohio, and Mrs. R. S. Walker, Florida; a son, Charles Friesell, professor of basic technology, School of Dentistry, University of Pittsburgh; two sisters, Mrs. H. Lee Fullerton and Mrs. James S. Dodds; two brothers, Dr. F. C. Friesell, professor of bacteriology and histology of the School of Dentistry, University of Pittsburgh, and Frank M. Friesell, San Francisco.

Be it resolved, that the Board of Trustees of the American Dental Association at their meeting on February 6, 1947 at Chicago express their profound sympathy on being informed of the death of H. Edmund Friesell.

Whereas, Dr. Friesell was a former president of the American Dental Association and exerted a profound influence on a large portion of its membership as an outstanding educator in the field of dentistry,

Whereas, Dr. Friesell was a profound scholar, sound thinker, and tireless worker, and with his personal charm was able to accomplish much for the dental profession,

Be it further resolved, that a copy of this resolution be spread on the official record of the American Dental Association and that it be published in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and also that a copy be sent to the family of Dr. Friesell.

DENTAL SOCIETIES

NATIONAL BOARD OF DENTAL EXAMINERS TO MEET APRIL 21

The National Board of Dental Examiners will hold its next sessions for the examination of candidates in Part I and Part II April 21-22 in schools where there are five or more candidates.

Applications for the examinations should be sent through the office of the dean of the dental school. For further information, write Gordon L. Teall, secretary, Box 71, Hiawatha, Kan.

DENTAL SCHOOL ASSOCIATION TO HOLD MEETING JUNE 23-25

The twenty-fourth annual meeting of the American Association of Dental Schools will be held June 23-25 in the Drake Hotel, Chicago, according to an announcement by John E. Buhler, secretary-treasurer of the association.

The second day of the meeting will be devoted to the conference sessions, and the evening of June 24 has been reserved for the annual Omicron Kappa Upsilon dinner.

CLEVELAND DENTAL SOCIETY TO OPEN SPRING CLINIC MAY 5

The annual spring clinic meeting of the Cleveland Dental Society will be held May 5-7 in the Hotel Statler, Cleveland, according to an announcement by H. J. Barnes, chairman of the publicity committee of the clinic committee.

D. R. Kinsley is general chairman for the clinic meeting.

Argentine Dentists Visit Chicago Midwinter Meeting

Members of the Asociacion Odontologica Argentina are shown as they attended the Midwinter Meeting of the Chicago Dental Society. From left to right in the bottom row are Julio Cesar Diaz, Argentina; Robert I. Humphrey, president, Chicago Dental Society; Sra. Malena Bisi, Argentina; Daniel F. Lynch, chairman of the Committee on International Relations, American Dental Association, and Jorge Bisi, Argentina. In the top row are Adalberto Rebosio, Argentina; Humberto Aprile, president, Asociacion Odontologica Argentina; Sterling V. Mead, president, American Dental Association, and Hipolito Lynch, Argentina

LATEST DENTAL SOCIETY ACTIVITIES AND MEETINGS

Alabama.—The seventy-eighth annual meeting of the Alabama State Dental Association will be held April 8-10 in Birmingham, according to George W. Matthews, secretary-treasurer.

Speakers on the program will include Maynard K. Hine, Indianapolis, on "Periodontia"; T. J. Cook, Miami, Fla., on "Diseases of the Mouth"; T. E. Braly, Chattanooga, Tenn., on "Restorative Dentistry"; L. R. Main, St. Louis, on "Roentgenology"; Walter T. McFall, Asheville, S. C., on "Children's Dentistry," and J. Benton Neil, Memphis, Tenn., on "Dentures."

California.—The seventy-seventh annual meeting of the California State Dental Association will be held in San Francisco April 27-30, according to L. E. Linehan, secretary.

Speakers scheduled for the meeting will include L. S. Fosdick, Northwestern University, on "Caries Prevention"; Harold J. Noyes, University of Oregon, on "Habits-Diagnosis"; Edward Reiter, Cleveland, on "Oral and Facial Swellings"; G. R. Lundquist, Northwestern University, on "Physiology of Periodontia"; B. B. McCollum, Los Angeles, on "Preventive Dentistry," and Grant Van Huysen, Indiana University, on "Physiologic Reaction of Dentin and Pulp to Operative Procedures."

The California State Board of Dental Examiners will meet June 16 in Los Angeles, K. I. Nesbitt, secretary, has announced.

Illinois.—New officers of the Illinois State Dental Society for 1947 have been installed. They are: L. H. Dodd, Decatur, president; Robert G. Kesel, Chicago, president-elect; M. E. Zinser, Chicago, vice-president; Paul W. Clopper, Peoria, secretary, and R. B. Mundell, Winnetka, treasurer.

Iowa.—The annual meeting of the Iowa State Dental Society will be held May

6-8 in Des Moines, according to an announcement by A. N. Humiston, Cedar Rapids, secretary.

Guest speakers on the program will include A. F. Romnes, Chicago, on "The Clinical Manipulation of Amalgam"; D. A. Listiak, Minneapolis, on "Fundamentals in Partial Denture Construction"; V. R. Trappozzano, Philadelphia, on "Complete Dentures"; Walter C. McBride, Detroit, on "Dentistry for Children," and George Christiansen, Detroit, on "Oral Surgical Conditions Which Confront the General Practitioner."

Louisiana.—The annual meeting of the Louisiana State Dental Society will be held April 10-12 in New Orleans, according to Julian S. Bernhard, Shreveport, secretary.

The program will include as speakers Clyde Davis, Lincoln, Nebr., on "Operative Dentistry"; W. T. Ewing, Akron, Ohio, on "Oral Surgery"; Albert W. Hiller, Fort Worth, Texas, on "Economic Side of Dentistry," and Sterling V. Mead, president, American Dental Association, on "Activities of the American Dental Association."

The Council on Dental Health of the Louisiana State Dental Society has established a veterans mediation committee, composed of five dentists who are ex-servicemen, to study any differences arising between the Veterans Administration and the state society and its members concerning administration of the VA dental program.

Michigan.—The annual meeting of the Michigan State Dental Society will be held April 14-16 in Detroit, according to H. C. Gerber, Jr., Lansing, executive secretary.

Speakers will include George W. Teuscher, Dental School, Northwestern University, on "Diagnosis in Pedodontics"; Kenneth A. Easlick, School of Dentistry, University of Michigan, on "The Public and the Practices of Dentistry in Michigan"; Samuel J. Lewis, Merrill Palmer School, Detroit, on "The Treatment of Malocclusion in the Light of Newer Knowledge"; Donald A. Kerr, School of Dentistry, University of Michigan, on "Oral Cancer—the Dentist's Responsibility"; Walter Pryor, Cleveland, on "Full Denture Prosthesis"; N. O. Taylor, School of Dentistry, University of Michigan, on "Your Money's Worth," and Clarence R. Jacobson, chief, dental division, Veterans Administration, Detroit, on "The Veterans Administration Dental Program."

Montana.—The annual meeting of the Montana State Dental Association will be held May 1-3 in Missoula, according to C. S. Renouard, Butte, secretary-treasurer.

The main speakers on the program will be George M. Hollenback, Los Angeles, on "Gold Inlays," and Ralph L. Christy, Denver, on "Upper and Lower Impressions."

New Jersey.—The annual meeting of the New Jersey State Dental Society will be held April 27-30 in Atlantic City, according to John B. Carr, Camden, secretary.

The principal speakers on the agenda will be LeRoy M. Ennis, Philadelphia, on "X-Ray"; George D. Greenwood, Rochester, N. Y., on "Practice Management"; Lewis Citron, White Plains, N. Y., on "General Dentistry"; Victor N. Citron, White Plains, N. Y., on "Acrylics"; Henry M. Goldman, Boston, on "Periodontia"; Simon Shapiro, Brooklyn, on "Fixed Bridgework"; Douglas B. Parker, New York, on "Oral Surgery"; Hyman Pines, New York, on "Porcelain Jackets," and Henry Hicks, Greenwich, Conn., on "Gold Inlay."

North Carolina.—The annual meeting of the North Carolina Dental Society will be held May 5-7 in Pinehurst, according to an announcement by C. W. Sanders, Benson, secretary-treasurer.

Speakers will include Harlan H. Horner, secretary, Council on Dental Education, American Dental Association; Sterling V. Mead, president, American

Dental Association; Clyde E. Minges, trustee of the American Dental Association from the fifth district; and E. M. Medlin, president, North Carolina Dental Society.

Others will be William H. Canavan, Boston, on "Local Anesthesia, Minor Oral Surgery"; B. F. Sapienza, Birmingham, Ala., on "The Cast Gold and Veneer Crowns"; Irving Hardy, Tufts College Dental School, on "Full Dentures," and William D. Lanier, chief of the dental division, Veterans Administration, Richmond, Va., on "Dental Service for Veterans."

The North Carolina State Board of Dental Examiners will meet June 23 in Raleigh, according to F. O. Alford, secretary.

Oklahoma.—The annual meeting of the Oklahoma State Dental Society will be held April 13-16 in Oklahoma City, according to E. W. Wise, Tulsa, secretary.

Guest speakers on the program will include Roy J. Turner, governor of Oklahoma; Willard Ogle, trustee of the American Dental Association from the twelfth district; Warren P. Willman, Chicago, on "Operative Dentistry"; L. R. Main, St. Louis, on "X-Ray"; G. Thaddeus Gregory, Indianapolis, on "Exodontia"; Paul Champlin, Enid, Okla., on "Cancer of the Mouth," and Sterling V. Mead, president, American Dental Association, on "Diseases and Treatment of the Oral Tissues."

South Carolina.—The South Carolina State Dental Association will hold its annual meeting April 27-29 at Myrtle Beach, S. C., according to J. R. Owings, Greenville, secretary-treasurer.

Speakers on the program will include C. H. Schott, Cincinnati, on "Economics"; Sidney Sorrin, New York, on "Periodontia," and James Harpole, Atlanta, Ga., on "Oral Surgery."

The South Carolina State Board of Dental Examiners will meet June 7 in Columbia, according to E. G. Bumgardner, secretary.

Texas.—The sixty-seventh annual meet- of the Texas State Dental Society will be held April 28-30 and May 1 in San Antonio, according to Willard Ogle, Dallas, secretary.

The program will include a talk by W. T. Ewing, Akron, Ohio, and four clinics, to be conducted by Ralph Rode, St. Louis, on "Oral Surgery"; Maynard K. Hine, Indianapolis, on "Periodontia"; B. F. Sapienza, Birmingham, Ala., on "Operative Procedure," and Lester W. Boyd, Chicago, on "Partial Dentures."

The Texas Society of Oral Surgeons and the woman's auxiliary of the state society will hold meetings during the state sessions.

Washington—The annual meeting of the Washington State Dental Society will be held May 5-7 in Spokane, according to C. W. Olsen, Spokane, program chairman.

Speakers on the agenda will include Donald A. Kerr, professor of oral pathology, School of Dentistry, University of Michigan, on "Periodontal Diseases and Treatment"; L. R. Main, dean, School of Dentistry, St. Louis University, on "Roentgenology, an Aid in Dental Practice," and George A. Selleck, professor of prosthetic dentistry, College of Physicians and Surgeons, San Francisco, on "The Present Status of Partial Denture Practice."

INDUSTRIAL DENTISTS TO OPEN MEETING APRIL 30 IN BUFFALO

The American Association of Industrial Dentists will meet April 30 and May 1 in the Statler Hotel, Buffalo, in conjunction with the thirty-second annual meeting of the American Association of Industrial Physicians and Surgeons.

Speakers on the program will include L. S. Morvay, Newark, N. J.; C. L. Sebelius, Nashville, Tenn.; J. E. DeCamp, Corning, N. Y., and E. R. Acton, Harrisburg, Pa. Dental speakers on the

program of the American Association of Industrial Physicians and Surgeons will include James M. Dunning, representing the American Association of Industrial Dentists, and C. R. Fricke, Etna, Pa.

DENTAL EDUCATION

NORTHWESTERN RECEIVES GRANT FOR PEDODONTICS FELLOWSHIPS

Charles W. Freeman, dean, Dental School, Northwestern University, has announced a gift of $100,000 to the university for the support of a new program of fellowships, teaching and research in pedodontics.

Dr. Freeman said the anonymous donation will be used to establish fellowships for dentists preparing to teach and do research work in pedodontics, with the ultimate objective of training more dentists to specialize in the field.

The fellowships will be under the direction of George W. Teuscher, professor of pedodontics at the Dental School, Northwestern University. As a step toward the setting up of fellowships, a conference of teachers of pedodontics from dental schools throughout the country will be held at Northwestern University in June, under the direction of Dr. Teuscher.

INVESTIGATION OF NEED FOR UTAH DENTAL SCHOOL REQUESTED

A memorandum to Gov. Herbert B. Maw of Utah has been framed asking that he appoint a fact-finding commission to investigate the need for a dental school at the University of Utah and to report in January 1948 its findings and recommendations.

The memorandum was submitted by a special committee of the Salt Lake District Dental Society, which was appointed last year by society president Victor H. Sears to study the feasibility of establishing a dental school in Salt Lake City at the university.

The report of the special committee was considered at a recent meeting of the dental society with state and university officials. The report made a comprehensive statistical study of the number of dentists, dental schools and students and the demand for dental work. It indicated a definite need for dental colleges to supply a growing demand but reached no conclusion regarding a college in Utah.

The report stressed the lack of dentists in the mountain states, especially in rural areas, and pointed out that in Utah, with 312 practicing dentists, the ratio is one dentist to every 2,030 persons. If a dental school is set up, the report held, it should provide for at least two hundred students.

An annual budget of $215,800 would be needed for a full four year course, and half that amount would have to be furnished by the state, according to the report.

The committee suggested that the Governor's fact-finding commission should be composed of representatives from the state dental association, the medical profession, the university board of regents and the state legislature.

Members of the special committee which prepared the report were Harold E. Nelson, Midvale, Utah, chairman; J. Rex Calvert, Salt Lake City, and E. A. Hunt, Salt Lake City.

OHIO STATE OFFERS SERIES OF POSTGRADUATE COURSES

A series of postgraduate courses is being offered at the College of Dentistry, Ohio State University, through the aid of the W. K. Kellogg Foundation, according to an announcement by Wendell D. Postle, dean.

The courses are: oral pathology, March 31 to April 5; x-ray, April 7-11;

crown and bridge, April 21-25; removable partial dentures, April 28 to May 2; full dentures, May 5-9; oral surgery, May 12-16; operative dentistry, May 19-23; endodontia (root canal therapy), May 26-30, and children's dentistry, June 2-6.

Inquiries concerning the courses should be addressed to the College of Dentistry, Ohio State University, Columbus 10.

FEDERAL AGENCIES

SURPLUS DISPOSAL PROGRAM FOR DENTISTS IS OUTLINED

The newest procedure for the disposal of surplus property equipment by the War Assets Administration to dentists has been outlined by the WAA, and a Senate subcommittee has called for a complete reorganization of the disposal administration.

Dental equipment, with one exception, is still held for sale to certified dentists only, but priorities based on the date of filing application are no longer effective. The dentist must have a Veterans Priority Certificate, but his position in line at a surplus equipment sale is determined by the number he draws from a container at the start of the sale.

The exception to the holding of dental equipment for dentists is the standing WAA regulation which permits equipment with a unit value of less than $100 to be disposed of as salvage and to be sold to nonprofessional buyers as junk. Thus, such articles as sterilizers, lights, handpieces and instruments are sold to buyers other than dentists.

A complete overhauling of the WAA has been urged by Senator Joseph C. O'Mahoney of Wyoming, who headed a surplus property subcommittee of the Military Affairs Committee in the Seventy-Ninth Congress. A report prepared by the subcommittee has been submitted to the Eightieth Congress.

The report points out that, after three years of surplus disposal, the job is only one-third completed and blames the "near breakdown" of the disposal program on the military men in charge. The report calls for "complete overhauling" of the WAA "with respect to top personnel, internal organization and policies."

SURPLUS GOLD STOCKS GO TO VETERANS ADMINISTRATION

Surplus stocks of dental gold handled by the War Assets Administration go directly to the Veterans Administration for use in the dental treatment of veterans, according to a WAA announcement.

The Veterans Administration takes all the dental gold that it can acquire from WAA surplus stocks, according to the announcement. None of the gold turned over to the WAA by the Army and Navy reaches the public. If the Veterans Administration or other federal agencies fail to absorb all the surplus gold in WAA stocks, the WAA ships the gold to the United States mint.

ARMY AND NAVY

CLEVELAND DENTIST AWARDED LEGION OF MERIT FOR SERVICE

Henry J. Toomey, Cleveland, has been awarded the Legion of Merit for exceptionally meritorious conduct in the southwest Pacific area from 1942 to 1945 as colonel in the Army Dental Corps.

Dr. Toomey was chief of the dental service of the Fourth General Hospital, an affiliate of Western Reserve University, Cleveland, and served in Australia, New Guinea and the Philippines. Dr. Toomey and members of his staff were honorary members of the Australian Dental Society while they were stationed in Melbourne.

Army Cites Dentist

John L. Courrier, East Orange, N. J., has been awarded a certificate of appreciation by the War Department for his service as head of the dental department of the New Jersey-Delaware Recruiting and Induction District

TWO DENTAL CORPS OFFICERS CITED FOR EXCEPTIONAL SERVICE

Two Dental Corps officers—Col. Alexander L. Ungar, New York, and Capt. Joseph A. Tartre, 13th Naval District dental officer, Seattle—have received service commendations.

Colonel Ungar, who was discharged from the Army Dental Corps in March 1946, was cited for the Army Commendation Ribbon for exceptionally meritorious service as chief of the Dental Clinic, General Dispensary, U. S. Army, New York, from July 1943 to November 1945.

Captain Tartre was awarded a commendation from Secretary of the Navy James V. Forrestal for his outstanding services as senior dental officer of the Naval Training Station at Great Lakes.

WORLD DENTISTRY

NEW OFFICERS ANNOUNCED FOR ARGENTINE DENTAL ASSOCIATION

The new officers of the *Asociacion Odontologica Argentina,* who were elected at a recent meeting, have been announced by the new president, Humberto Aprile.

Other officers are Jorge French, vice-president; Raul Otano Antier, secretary; Eduardo M. Amadeo, assistant secretary; Pedro Saizer, treasurer, and Hermenegildo M. Arnejo, assistant treasurer. Alberto H. Taliabue will head the Committee on Ethics of the organization. Members of the Committee to Review Expenses are Fernando Archain, Victor J. Chagra and Oscar A. Maisto.

ITALIAN DENTAL SOCIETY ASKS FILMS, MATERIAL FOR MEETING

The Italian Dental Association is planning a triennial Congress of Dental Prosthesis and Laboratory Materials. The initial meeting, which will be the first of its kind in Italy, is scheduled for sometime after May 1, according to A. K. Ovadia, foreign secretary of the association.

The association has issued a plea for material and equipment to be used at the meeting, especially for films to be loaned through the various embassies. To facilitate the importation of dental films and material, the association is asking for temporary import permits and will take care of securing the material, once provided with a list of available equipment, with its weight and value.

The program for the first meeting will include an exhibit of Italian dental prostheses, lectures by Italian and foreign dentists and an exhibit of dental and laboratory material, instruments and machines. This exhibit will have to be sup-

plied chiefly from contributions by other countries.

The meeting will be held in the George Eastman Higher Institute of Dentistry in Rome, where the first dental congress held by the Italian Dental Association took place last October.

The association is also setting up plans for a school of dental technicians with a four year course.

Information concerning films, books and equipment which can be borrowed should be sent to the *Associazone Medici Dentisti Italiani,* Viale Regine Margherita, 287, Roma, Italy.

H. M. SELDIN WILL ADDRESS MEXICAN DENTISTS OFFICIALLY

Harry M. Seldin, New York, has been named by Sterling V. Mead, president, American Dental Association, as an official representative of the American Dental Association to appear before the dentists of Mexico.

Dr. Seldin will speak to dentists in Mexico chiefly on topics related to the advancement of general anesthesia.

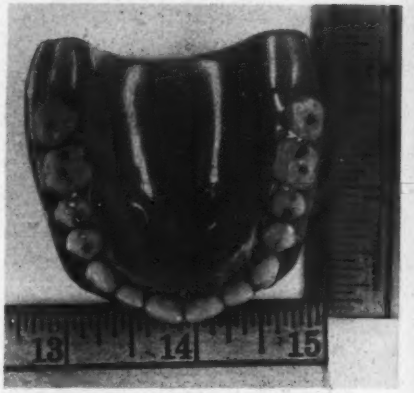
GENERAL NEWS

CITY OF DONNA, TEXAS, SEEKS PRACTICING DENTIST

The city of Donna, Texas, which is without a dentist at the present time, is seeking a dentist to open practice.

J. W. Smith, president of the Donna Junior Chamber of Commerce, has announced that a new modern office building in Donna has an office especially designed for a dentist. The office includes a reception room and a combination practice room.

Donna has a population of approximately 5,000 with a surrounding rural population of an additional 5,000 persons.



Dental Identification Needed

The Oregon State Police have requested the aid of the dental profession in identifying the upper denture found on the body of a woman taken from the Willamette River in Oregon in March 1946. Attempts to identify the body so far have failed

OREGON POLICE ASK DENTAL AID IN IDENTIFYING WOMAN

The Department of State Police, Medical School, University of Oregon, has requested the aid of the dental profession in the identification of a woman whose body was found in the Willamette River between Oregon City and Portland, Ore., in March 1946.

The woman was approximately five feet, two inches in height, weighed about 110 pounds, was 48 to 55 years of age, and had grey hair which had once been brown, according to Howard L. Richardson, director of the state police crime detection laboratory.

A picture of the woman's upper denture is being published in THE JOURNAL in the hope that some dentist may recognize it. A description of the woman's dentures by Horace M. Miller, professor of exodontia, Dental School, University of Oregon, follows.

The upper denture is made of acrylic resin, with the shade and mold determined as SP Shade 15. The upper denture has the lingual cusps of the molars ground flat, probably for

the purpose of articulation with a lower partial denture which was not found on any part of the body.

Palatal relief was made on the denture, the anterior of which was ground out, and there is heavy post damming, also lightly carved rugae. The labial aspect is slightly stippled and has nicely carved festooning. The teeth are the Old Type True Bite, which are not used today. The denture was probably made in 1940-1941. The manufacturers of RX39 definitely claim that the denture material is not theirs.

The lower jaw shows all molars and second bicuspid teeth missing. There is considerable recession of the mandible in this region, showing that these teeth have been out for some time and that a partial denture has apparently been worn, as the first bicuspid teeth show wear in the clasp region. There are labial class 5 foil fillings in the lower left cuspid, the left lateral and central incisors and the right central incisor with caries starting around each of the fillings.

The lower left central incisor has a mesio-occlusal silicate filling of considerable age. The right lateral incisor has extensive caries and could have had a gold foil filling at one time. The right bicuspid has extensive caries, and the occlusal surfaces of the lower teeth are heavily worn.

DAVID S. K. DAI, NOTED CHINESE DENTIST, KILLED IN PLANE CRASH

David Shu-ku Dai, superintendent of the dental clinic and professor of oral health, West China Union University, Chengtu, China, and secretary of the National Dental Health Board, Nanking, China, was killed last December in an airplane crash in China.

Dr. Dai, first Chinese to become a member of the American Dental Association, did postgraduate work at the University of Rochester, the Murry and Leonie Guggenheim Dental Clinic, New York, and the University of Michigan, from 1940 to 1943.

He was chief of the Department of Oral Health, West China Union and National Central University Colleges of Dentistry, 1938-1941, and was a Fellow of the American College of Dentists.

ESSAY CONTEST TO BE HELD IN NORWAY ON CAUSES OF CARIES

The Norwegian Association for the Care of the Teeth has offered a prize for the best essay on the causes for the decline of dental caries in Norway during the war.

Extensive studies on dental caries were possible in Norway during the German occupation because of the careful measurements of the restricted food supplies and because of the forced changes in diet habits.

Judges for the contest will be selected by the Faculty of Medicine, University of Oslo, the Norwegian Dental High School and the Norwegian Association for the Care of the Teeth. The competition will close September 1.

PEORIA DENTAL SOCIETY HONORS WALLACE N. KIRBY

Wallace N. Kirby, Downers Grove, Ill., was honored recently by the Peoria District Dental Society of Illinois, with a social hour and dinner. Dr. Kirby was one of the clinicians at the Midwinter Meeting of the Chicago Dental Society and reported on the clinics and suggestions for dentistry at the meeting.

NEW YORK DENTIST HEADS HOSPITAL MEDICAL BOARD

Joseph J. Stahl, Garden City, N. Y., a member of the Second District Dental Society of New York, has been elected president of the medical board of Mary Immaculate Hospital, Jamaica, N. Y. It is believed that this is the first time that a dentist has held this position.

Dr. Stahl has been director of the dental service at the hospital and a member of the medical board since 1931.

COUNCIL ON DENTAL HEALTH

STATEMENT ON CONTROL OF DENTAL CARIES

For several years the Council on Dental Health of the American Dental Association has been cognizant of the need for a basic statement on the control of dental caries. Owing to the fact that all dental health programs place special emphasis on the prevention and control of dental caries, a concise explanation of present knowledge of the cause and results of dental caries will be of value to all persons who have an interest in this field.

This statement represents several years of careful study; its authenticity is assured by the fact that it was submitted for the critical review of a large committee composed of recognized authorities in the field of dentistry and dental research. The caries control statement will be revised from time to time as new facts are discovered, so that it may serve as a reliable guide in health education, prevention and control programs in the future. —*Allen O. Gruebbel, Executive Secretary.*

Caries Control Statement

Dental caries, or tooth decay, is one of the most common diseases, and few people are naturally immune to it. It may begin soon after the primary, or baby teeth, have appeared in the mouth, is common by the third year of life and may continue as long as the teeth are present. Dental caries can result in much suffering, and it would be a great blessing to human beings if this disease could be prevented. Although dental caries or tooth decay can be controlled to a large degree, there is not as yet sufficient knowledge to prevent it as has been done in the cases of smallpox, typhoid fever or diphtheria. However, methods of control and treatment have so advanced that there is no longer a reason for the loss of teeth because of dental caries. In view of the widespread prevalence of tooth decay and the great loss of teeth which it causes, this statement may appear surprising. This does not mean that all of the causes of tooth decay are known or that tooth decay now can be prevented entirely; it does mean that tooth decay can be controlled or checked successfully.

There is as yet no single factor which in itself will give complete control over tooth decay. The whole program of control consists of four parts, all of which are essential. These four parts are:

Early and Frequent Examination

Dental caries usually begins early in life, and studies have shown that as high as 50 per cent of 2 year old children have one or more carious teeth. With increase in age, teeth tend to decay more rapidly, and at the age of 16 years, the average person has 7 decayed, missing or filled teeth with an involvement of 14 tooth surfaces.

Because tooth decay begins at such an

early age and increases so rapidly, children should be examined by the dentist not later than in the third year of life. Thereafter, examinations should be made as frequently as the dentist recommends on the basis of individual need.

It should be remembered that tooth decay begins in a small area on the tooth surface or deep in a fissure. Although areas of decay on the chewing surfaces can be found by the dentist without the aid of roentgenograms, careful studies have shown that x-ray examination is necessary if all cavities of the surfaces between the teeth are to be found in the early stage when control measures are most effective.

Therefore, complete and frequent examination constitutes the first step in protecting children against tooth decay. Without frequent examinations, which should locate each point of initial decay, control is impossible and the presence of decay will not become evident until children complain of pain or show other evidence of infection.

Early Treatment

The second step in the control of dental caries is early treatment. Early tooth decay which is found in the examination can be treated with little or no discomfort to the patient, in a shorter period of time, with a minimum loss of tooth structure and at a minimum expense.

Delay in treatment of these small initial cavities will allow tooth decay to progress and result in pain and loss of the tooth. Once a cavity has been formed, it can be repaired only by the removal of the decayed tooth structure and the insertion of a filling. The early treatment of the smallest areas of decay which can be detected by the dentist is the only wise course to follow for both permanent and primary teeth.

Diet and Nutrition

As a contribution to proper growth and development of the teeth and jaws, adequate nutrition is essential. Although our knowledge of the relation of nutrition to tooth decay is incomplete, many authorities believe that a well balanced diet during childhood affords considerable protection. This protection may come through proper development of the bones and teeth and through normal eruption of the teeth in their proper positions in relation to each other, a condition which gives little opportunity for the retention of quickly fermentable sugars and starches and makes cleansing with the toothbrush easier and more effective.

It is now widely believed that decay of the enamel is caused by acids produced in the fermentation of sugars. For this reason, the use of sugar should be restricted, and a considerable reduction in sugar consumption can be achieved by eliminating confections and sweetened beverages from the diet.

Mouth Hygiene

Cleanliness of the mouth may aid in the control of tooth decay. The purpose of brushing the teeth, in this respect, is to remove fermentable food debris. Acid fermentation takes place in the mouth within a few minutes, and, if fermentable material is not soon removed, brushing the teeth will be of little or no value in preventing decay. Tooth pastes, powders and liquids are used only to aid the brush. As far as is known, there is no powder, paste or liquid dentifrice which in itself will prevent tooth decay, nor is there, at the present time, any chemical or antiseptic compound for home use which will give this protection. Extensive studies of agents such as fluorine, synthetic vitamin K, urea, penicillin and other drugs are in progress. If the results of these investigations justify their general use, these drugs will be recommended later. In most instances, the proper use of a satisfactory toothbrush, a safe dentifrice and dental floss followed by thorough rinsing of the mouth with water immediately after eating will assure

maximum benefits, but the effectiveness of this procedure in the control of tooth decay has not been established.

Summary

Dental science has advanced to the point where decay of the teeth can be controlled. The following four measures are necessary for its accomplishment:

1. Regular visits to the dentist for examination.
2. Early treatment of small cavities. Delay will be serious.
3. Selection and consumption of a proper diet and temperance in the use of confections and sweetened beverages.
4. Proper and regular cleaning of the teeth after eating. Your dentist can aid in teaching you a correct method.

The foregoing program for the control of tooth decay is approved by the Council on Dental Health of the American Dental Association. The Council recommends to parents, teachers, health workers and others interested in child health that the program be seen as a whole with each of its parts making some contribution to the problem of conserving child health and the health of the teeth. It is the hope of the Council that this statement will be seen as a brief outline of the knowledge at our command for the control of a condition which is affecting more than 95 per cent of our population. It is also the desire of the Council that this knowledge be put to immediate and effective use in the interest of the dental and general health of children and adults of the whole country.

COUNCIL ON DENTAL THERAPEUTICS

COUNCIL LISTS PRODUCTS FOR "ACCEPTED DENTAL REMEDIES"

THE Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following product in the list of Accepted Dental Remedies:

Dentifrices[1]

Bi-Salin Tooth Powder: Each hundred grams is stated to contain precipitated calcium carbonate (Sturge #130), 58.85 gm.; sodium bicarbonate, 23.4 gm.; sodium chloride, 10.1 gm.; magnesium carbonate, 3.2 gm.; soap (powdered castile, U.S.P.), 1.5 gm.; saccharin, 0.2 gm.; flavor (oil of peppermint, 1.75 gm.; methyl salicylate, 1.0 gm.), 2.75 gm. Manufactured by the Bi-Salin Laboratories, Box 132, Chicago.

1. A.D.R., Ed. 12, p. 156.

Admission of a product to the list of Accepted Dental Remedies means that the product and the methods by which it was marketed at the time of consideration were not found to be in violation of the Council's published rules. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics which is available upon request, and inquiries are welcomed.—*Donald A. Wallace, Secretary.*

CAREY LABORATORIES CORP. AGREES TO STOP MISREPRESENTING MEDISALT TOOTH POWDER

THE Federal Trade Commission accepted from the Carey Laboratories Corp., Hutchison, Kan., a stipulation to cease and desist from misrepresenting the properties and effectiveness of Medisalt Tooth Powder and from disparaging products.

The corporation agrees to stop representing that Medisalt Tooth Powder is effective in making or keeping the gums firm or healthy, in revitalizing the gums or in causing loosened teeth to become solid or sound; that it will keep the teeth or gums in perfect condition or that the sensitivity of the mouth to the use of the product indicates that the gums need it; that it is effective in banishing bad breath or in purifying or deodorizing the breath; that it will have any effect in preventing the development of a cold or in protecting the throat against infection or against the irritation of a cold; that it has an effective antiseptic action, sterilizes dental plates or cleans the teeth in a new way, or that other dentifrices generally make the gums soft or sensitive or are harmful.

Stipulation 7568, February 1, 1947.

COMMITTEE ON LEGISLATION

ANALYSIS OF THE NATIONAL HEALTH ACT OF 1947, S.545

THE National Health Act of 1947, S.545, was introduced in the Eightieth Congress by Senators Taft of Ohio, Smith of New Jersey, Ball of Minnesota and Donnell of Missouri and was referred to the Senate Committee on Labor and Public Welfare, of which Senator Taft is chairman. It will probably be known as either the "Taft Bill" or the "Taft-Smith-Ball-Donnell Bill."

The bill sets forth certain declarations by Congress concerning the policy of the government toward health, which are as follows: (1) that the federal government health and medical functions are widely scattered throughout many agencies, resulting in confusion and duplication of effort and requiring state officials to submit plans to numerous federal officials; (2) that inadequacies in the distribution of dental, medical and public health services prevent some persons from securing adequate care; (3) that it is the policy of the United States to aid the states to make available dental, medical, hospital and public health services to every individual regardless of race or economic status, and (4) that it is the policy of the United States to permit voluntary deductions from the salaries of federal employees for prepayment health premiums.

Title I — National Health Agency

The bill will create an independent agency to be known as the National Health Agency, which will be a part of the executive branch of the government, but will not be a department with cabinet status.

The chief executive officer of the National Health Agency will be the National Health Administrator. He will be appointed by the President by and with the advice and consent of the Senate and will receive a salary of $15,000 per annum. The Administrator must be a citizen of the United States, a doctor of medicine licensed to practice in one or more states and must be outstanding in the field of medicine. The Administrator will be prohibited from engaging in any other business or vocation.

The purpose of the Agency will be to aid and foster progress in health by centralizing in the Agency the federal government activities relating to health. It will have authority to advise and cooperate with state governments and private agencies, to collect and analyze statistics and make studies of the health needs of the country, and to make reports and recommendations regarding policies and methods for the promotion of health services.

The Agency will be responsible for federal governmental activities concerned with: (1) administration of funds appropriated for dental care, medical and hospital care, hospital facilities and other health activities; (2) prevention of disease through water purification, sewage treatment, elimination of lake and stream pollution and promotion of research; (3) promotion of maternal, prenatal and child care; (4) protection of the national health by promoting purity, standard potency and truthful informative labeling of foods, drugs and cosmetics; (5) training and rehabilitation of persons vocationally handicapped because of permanent disability with the objective of placing such persons in remunerative employment, and (6) administration of the Hospital Survey and Construction Act of 1946.

The federal agencies to be transferred to the National Health Agency are as follows: Public Health Service, Saint Elizabeths Hospital, Food and Drug Administration, some of the functions and duties of the Children's Bureau in the Social Security Administration and Division of Health Studies in the Bureau of Research and Statistics of the Social Security Administration. The health functions of the Army, Navy and Veterans Administration, however, are not being transferred to the Agency.

The activities of the Agency are to be divided into the following constituent units: (1) Office of the Administrator, (2) Public Health Service, which in turn will assume the administration of Saint Elizabeths Hospital and Freedmen's Hospital, (3) Office of Medical and Hospital Care Services, (4) Office of Dental Care Services, (5) Office of Maternal and Child Health, (6) Office of Health Statistics, (7) Food and Drug Administration and (8) such other constituent units as the Administrator finds necessary.

The Director of the Office of Dental Care Services will be a doctor of dental surgery who has had at least ten years of active practice and who is outstanding in the field of dentistry. The Director of the Office of Medical and Hospital Care Services will be a doctor of medicine licensed to practice medicine in one or more states, who has had at least five years of active medical practice and who is outstanding in the field of medicine.

The Administrator is required to make a report in writing to Congress and the President each year, giving an account of all moneys received and disbursed, describing the work done by the Agency and making recommendations. The Administrator is to make a study of the organization of the Agency within six

months after the Act becomes effective and report his findings and recommendations to Congress. This study is to cover all aspects of the organization of the Agency, including (1) salaries, (2) the desirability of retaining or modifying the commissioned corps of the Public Health Service and (3) the desirability of establishing an Office of Health and Medical Research as a constituent unit of the Agency.

Title VIII — Dental Health Services

Part A, Dental Survey.—The bill authorizes an appropriation of $1,000,000 to be allocated to the states on a grant-in-aid basis, for the purpose of assisting the states in making an inventory and survey of their dental care resources. In order to receive the survey funds the state must designate a temporary state advisory council to consult with the state agency regarding the state survey. It will include representatives of nongovernmental organizations, state agencies concerned with the provision of dental care services and users of dental care services who are familiar with the need for such services in urban or rural areas.

Part B, Dental Care Services. — The bill appropriates $8,000,000 for the fiscal year ending June 30, 1948 and increases this by $4,000,000 per year for the next three years until the sum of $20,000,000 per year is reached, to be used as grants-in-aid to the states to provide dental examinations for school children and necessary dental care for those school children whose families are unable to pay the whole cost of such care.

In order to obtain such funds the state may submit a plan which must (1) designate a single state agency as the sole agency for the administration or for supervising the administration of the plan, providing that after 1949 such agency shall be the state health agency; (2) provide for the designation by the governor of a state dental health advisory council which shall include representatives of nongovernmental groups or organizations and of state agencies concerned with the providing and administering of dental health services, including representatives of state dental associations and other groups interested in the improvement of dental health and in the better distribution of dental services; (3) contain satisfactory evidence that the state agency will have authority to carry out such plan; (4) set forth a state-wide program designed and calculated within five years to provide for the periodic inspection of the teeth of all children in the elementary and secondary grades of the public and nonpublic schools in the state and to provide for the dental care and treatment of dental diseases and defects, including prophylaxis, filling, roentgenograms, extraction and related care, other than straightening, of the teeth of those children in the elementary and secondary grades of public and nonpublic schools of the state who have, or whose family or guardian has, insufficient income to pay for the whole cost of such services.

Such program *may also at the option of the state* provide dental care for those families and individuals in the state who have insufficient income to pay the whole cost of such services. Such program shall provide for the collection of proper charges of less than the total cost of the services rendered to individuals and families unable to pay in whole but able to pay in part therefor. Such program may also provide for the furnishing of such services to such families and individuals by means of payments (in the nature of premiums, partial premiums, reimbursement of expenses or otherwise) by the state to any nonprofit voluntary dental care fund or other fund operated not for profit, in behalf of those families and individuals unable to pay the whole cost of such services or insurance therefor. Such program may include and take ac-

count of services rendered or to be rendered by governmental subdivisions of the state and by private organizations operating not for profit and may provide for the payment to such institution by the state or subdivision for dental care to such families and individuals. Such program may include payments to dentists practicing in areas which, without such payments, would be unable to provide sufficient income to attract a practicing dentist. Such program may provide for the training of personnel for state and local public health work in dentistry.

Further, in order to obtain such funds the state plan must (5) describe the financial contribution to be made by the state, its local subdivisions and its private institutions, which contributions shall be sufficient at the end of said period of five years to carry out the program described in (4). The financial contribution to be made by the state and its governmental subdivisions shall be at least equal to the federal aid payable under this title, provided that nothing herein shall modify obligations assumed by the federal government under other statutes for the medical and hospital care of veterans.

The state plan must (6) be based on a state-wide inventory of existing dental care including that provided by the state and by private organizations and shall describe in detail the extension of such services to the end that they be furnished without discrimination as to race, creed or color to all persons unable to pay in full therefor; (7) provide that the state agency will make such reports in such form and containing such information as the Director may from time to time reasonably require and give the Director, upon demand, access to the records upon which the information is based, and (8) provide that the state agency will from time to time review its plan and the operation thereof and submit to the Director any modification thereof which it considers necessary.

The Director of the Office of Dental Care Services is required to approve any state plan which meets the above conditions. If he disapproves any state plan, the National Dental Health Council must afford the state agency a hearing. If the Council determines that the state plan meets all the aforementioned conditions, the Director must approve the plan. No state plan may be disapproved because the Director disapproves of the methods proposed, if the program is designed to provide dental care, treatment and examination as set forth in the bill at a cost within the probable resources of the state with federal aid. It is intended that the state shall devise in each case the methods by which this end is attained.

The bill will create a National Dental Health Council to consist of the Director ex-officio, who will serve as chairman, and six members to be appointed by the Administrator. The six appointed members will be persons not otherwise in the employ of the federal government who are outstanding in fields pertaining to dental health, at least four of whom will be doctors of dental surgery who have had not less than ten years of active practice and who are licensed to practice dentistry in one or more of the states. The other two appointive members will be persons familiar with the needs for dental care in urban or rural areas. Each appointed member will hold office for a term of three years. An appointed member will not be eligible to serve continuously for more than two terms but will be eligible for reappointment if he has not served for two consecutive terms immediately prior to his reappointment.

The Council is authorized to appoint special advisory and technical committees to assist it. Council members and members of advisory or technical committees, while serving on the business of the Council, will receive compensation at rates to be fixed by the Administrator (not to exceed $25 per day) and will also be entitled to receive an allowance for actual and necessary travel and sub-

sistence expenses while serving away from their places of residence. The Council will meet as frequently as the Administrator deems necessary but not less than once each quarter. Upon request by three or more members, it will be the duty of the Administrator to call a meeting of the Council.

At the end of each year each state is required to make a complete report to the Director of the Office of Dental Care Services showing in full the activities of the state, the manner in which the federal government funds have been spent and such other information as the Director may require. If the Director finds that the state agency is not complying substantially with the state plan as approved by the Director, that any Federal funds have been diverted from the purposes for which they were granted or that the state has failed to provide toward the plan at least as much money as it received from the federal government, then the Director may stop further payments to the state. If this is done, however, the state may appeal to the United States Court of Appeals. This court will have jurisdiction to affirm the action of the Director or to set it aside in whole or in part. Further, the judgment of this court will be subject to review by the Supreme Court of the United States.

The Director will be required to call a conference of the representatives of all of the state agencies at least once each year and he may call other conferences if necessary. Whenever five or more state agencies request such a conference, the Director is required to call a conference of all of the state agencies joining in the request.

The bill provides that nothing in this title shall be construed as conferring on any federal officer or employee the right to exercise any supervision or control over the administration, personnel maintenance or operation of the Dental Health Services with respect to which any funds have been or may be expended under this title.

Allocation.—The grants-in-aid funds for dental health services are to be allotted to the several states according to a complex mathematical formula that takes into consideration the population of the state and the ratio of its percentage of taxpaying ability to that of all of the states. The accompanying table lists the several states and the amounts that will be available to each on the basis of its population, its percentage of taxpaying ability and the federal government appropriation of $20,000,000 for the fiscal years ending June 30, 1951 and 1952.

There is a similar provision for the allocation of grant-in-aid funds for medical and hospital care services, except that the amount appropriated each year by the federal government is $200,000,000. Thus the amount available to a state each year for medical and hospital care services will be ten times the amount shown for dental health services.

Title IX — Research and Training

Part A, Dental Research.—The bill will create a National Institute of Dental Research as a division in the National Institute of Health which is a research unit in the United States Public Health Service. The Surgeon General of the Public Health Service, through the National Institute of Dental Research and in cooperation with the National Dental Health Council, is authorized:

(a) to conduct, assist and foster research, investigations, experiments, demonstrations and studies relating to the cause, treatment, control and prevention of dental diseases and impairments;

(b) to promote the coordination of research conducted by the Institute and similar research conducted by other public and private agencies, organizations and institutions and to make grants-in-aid to public and private agencies, organizations and institutions for conducting dental research;

Allocations in accordance with the provisions of the Taft-Smith-Ball-Donnell National Health Bill of 1947, S. 545, relating to dental health services for school children and families and individuals with low income, based on a federal government appropriation of $20,000,000

State	Population July 1, 1945	Taxpaying ability, %	Weighted population	Distribution, %	Allocation
Alabama	2,812,301	66.6667	1,874,868	2.7188	543,760
Arizona	630,298	60.6965	382,569	0.5548	110,960
Arkansas	1,779,817	66.6667	1,186,545	1.7206	344,120
California	8,822,688	37.0258	3,266,671	4.7371	947,420
Colorado	1,120,595	53.3917	598,305	0.8676	173,520
Connecticut	1,786,300	35.8560	640,496	0.9288	185,760
Delaware	286,832	38.9155	111,622	0.1619	32,380
District of Columbia	938,458	39.4822	370,524	0.5373	107,460
Florida	2,385,917	60.3960	1,440,998	2.0896	417,920
Georgia	3,191,766	66.6667	2,127,845	3.0857	617,140
Idaho	500,109	55.2036	276,078	0.4004	80,080
Illinois	7,721,099	42.3244	3,267,909	4.7389	947,780
Indiana	3,437,745	48.8978	1,680,982	2.4377	487,540
Iowa	2,259,526	53.6264	1,211,702	1.7571	351,420
Kansas	1,740,379	52.9859	922,155	1.3372	267,440
Kentucky	2,578,179	66.6667	1,718,787	2.4925	498,500
Louisiana	2,456,057	66.6667	1,637,372	2.3744	474,880
Maine	785,913	53.3333	419,153	0.6078	121,560
Maryland	2,125,419	43.7276	929,395	1.3477	269,540
Massachusetts	4,183,179	42.5829	1,781,319	2.5832	516,640
Michigan	5,471,774	43.9640	2,405,611	3.4885	697,700
Minnesota	2,497,485	56.8765	1,420,482	2.0599	411,980
Mississippi	2,080,377	66.6667	1,386,919	2.0112	402,240
Missouri	3,556,693	55.9633	1,990,443	2.8864	577,280
Montana	457,624	49.0452	224,443	0.3255	65,100
Nebraska	1,198,492	54.8315	657,151	0.9530	190,600
Nevada	159,804	38.9776	62,288	0.0903	18,060
New Hampshire	452,174	60.6965	274,454	0.3980	79,600
New Jersey	4,200,941	40.0986	1,684,519	2.4428	488,560
New Mexico	535,220	66.6667	356,814	0.5174	103,480
New York	12,584,913	36.8859	4,642,058	6.7316	1,346,320
North Carolina	3,504,626	66.6667	2,336,419	3.3881	677,620
North Dakota	520,935	55.1412	287,250	0.4166	83,320
Ohio	6,873,448	43.4938	2,989,524	4.3352	867,040
Oklahoma	2,034,460	66.6667	1,356,307	1.9668	393,360
Oregon	1,206,322	43.1477	520,500	0.7548	150,960
Pennsylvania	9,193,957	47.8431	4,398,674	6.3787	1,275,740
Rhode Island	758,222	42.2877	320,635	0.4650	93,000
South Carolina	1,905,597	66.6667	1,270,399	1.8422	368,440
South Dakota	555,347	59.2953	329,295	0.4775	95,500
Tennessee	2,878,777	66.6667	1,919,186	2.7831	556,620
Texas	6,786,740	63.6245	4,318,029	6.2617	1,252,340
Utah	616,989	53.4502	329,782	0.4782	95,640
Vermont	310,352	57.8199	179,445	0.2602	52,040
Virginia	3,079,706	62.1656	1,914,518	2.7763	555,260
Washington	2,088,574	38.6688	807,627	1.1712	234,240
West Virginia	1,724,677	66.6667	1,149,785	1.6673	333,460
Wisconsin	2,952,205	51.5312	1,521,307	2.2061	441,220
Wyoming	246,766	52.6429	129,905	0.1884	37,680
Alaska, Hawaii, Puerto Rico, Virgin Islands	2,988,300	.....	.....	.....	559,780
Totals	134,964,074*	.....	68,959,197	100.0000	$20,000,000

*Does not include members of the armed services stationed outside the continental United States.

(c) to provide fellowships in the National Institute of Dental Research and in other public and private institutions assisted with such stipends and allowances (including traveling and subsistence expenses) as he may deem necessary for the purpose of obtaining the consultation and advice of persons who are experts in the field of dental diseases from the United States and abroad and of training persons to carry on research activities.

In order to assist the Surgeon General prepare programs of dental research, the National Dental Health Council is authorized:

(a) to review research projects or programs submitted to it, or to initiate its own research projects, relating to the causes, treatment, control or prevention of dental diseases and impairments, and to certify approval to the Surgeon General of any such projects which it believes show promise of making valuable contributions to human knowledge with respect to the causes, prevention or methods of treatment of dental diseases;

(b) to collect information as to studies which are being carried on in the United States or any other country as to the cause, prevention or methods of treatment of dental diseases and, with the approval of the Surgeon General, to make available such information through appropriate publications for the benefit of dental agencies and organizations (public or private), dentists, other scientists and the information of the general public;

(c) to review applications from any university, hospital, dental clinic or other institution, whether public or private, for grants-in-aid for research projects relating to dental health, and to certify to the Surgeon General its approval of grants-in-aid for such projects as show promise of making valuable contributions to human knowledge with respect to such problems;

(d) to recommend to the Surgeon General the acceptance of conditional gifts, and

(e) to make other recommendations to the Surgeon General.

The bill will authorize an appropriation for the fiscal year ending June 30, 1947, for grants-in-aid for dental research and training not to exceed $75,000 and for research and scholarships within the National Institute of Dental Research not to exceed $175,000; for the fiscal year ending June 30, 1948, for grants-in-aid for dental research and scholarships not to exceed $150,000 and for research and scholarships within the National Institute of Dental Research not to exceed $250,000, and for subsequent fiscal years for grants-in-aid for dental research and scholarships not to exceed $300,000 and for dental research and scholarships within the National Institute of Dental Research not to exceed $300,000.

Part B, New Construction for Research. —An appropriation of not to exceed $2,000,000 also will be authorized for the erection and equipment of a suitable and adequate building and other facilities for the use of the National Institute of Dental Research. The Administrator is authorized to acquire a suitable site in or near the District of Columbia.

Title VII — General Medical Service

Part A, Medical Care Survey. — The bill will appropriate $3,000,000 to be used as grants-in-aid to the states for making an inventory and survey of medical care resources. Each state will be required to appoint a temporary advisory council to consult with the state agency.

Part B, Medical Care Services.—The sum of $200,000,000 will be appropriated for the fiscal year ending June 30, 1948 and for each of the four succeeding years for grants-in-aid to the states for medical care services.

Each state medical care plan must designate a single state agency to administer or to supervise the administration of the plan and must provide for the des-

ignation by the governor of a state medical and hospital care advisory council. This council will include representatives of nongovernmental organizations, state agencies, state medical associations, state hospital associations, voluntary nonprofit prepaid medical care plans and hospital plans and other groups interested in the improvement and better distribution of medical and hospital services. It must be designed to provide within five years:

(a) hospital, surgical and medical services for all those families and individuals in the state having insufficient income to pay the whole cost of such, and

(b) periodic physical examinations for all children in elementary and secondary schools in the state.

Such program may, *at the option of the state,* provide medical care services in one or more of the following ways: in institutions, in the home or in physicians' offices.

It must provide for the collection of proper charges of less than the total cost of such service from persons unable to pay in whole but able to pay in part therefor. The program may use prepayment plans and may provide subsidies to physicians practicing in certain areas.

A state plan must be based on a statewide inventory of existing medical, surgical and hospital care and must describe in detail the extension of such services to the end that they be furnished without discrimination as to race, creed or color to all persons unable to pay in full therefor.

The bill will create a National Medical Care Council consisting of the Director of Medical and Hospital Care Services, ex-officio, who is to serve as chairman, and eight members to be appointed by the Administrator. Five of the eight appointed members will be persons outstanding in fields pertaining to medical and hospital care and at least four of them will be doctors of medicine. The other three appointive members will be persons familiar with the needs for medical and hospital care in urban or rural areas.

Title II — Cancer Control

The bill will appropriate $10,000,000 per year as grants-in-aid to assist the states in establishing and maintaining adequate measures for the prevention and control of cancer. It is intended that these funds shall be used by the states to set up diagnostic clinics and not for research or treatment.

Title III — Miscellaneous

Any officer or employee of the United States Government may request the government to deduct from his salary a fixed sum or percentage to be paid to a voluntary nonprofit organization undertaking to provide, or to insure against the expense of, dental, medical, hospital or any other services connected with health.

The term "United States" includes all departments, bureaus, agencies and other divisions of the government and also includes those corporations which are wholly owned by the government.—*George H. Fox, Secretary.*

BOOK REVIEWS

Anatomy of the Head and Neck. By R. T. Hill, Ph.D. Philadelphia: Lea & Febiger, 1946.

It would indeed be unfortunate if the fashion of publishing revamped laboratory outlines as "textbooks" should spread. The book by Hill is a warning example. A teacher of anatomy may be an excellent routine worker; he may know all the details of anatomy and he may be most skillful in the technic of dissection; but still he should not consider himself capable and ready to write a textbook if he has nothing original to contribute or if he cannot, at least, present the material in an original way.

A laboratory outline, which is constantly supplemented or even corrected by the personal instruction of the teacher, is a necessary aid for the teacher who must deal with a large class without having enough competent help and without having enough time for individual teaching. The presentation of such an outline, even enlarged by a few additional chapters, as an independent book and the infliction of it on other teachers and their students could be excused only if the outline is written by a true master in his field. The retention of such passages as "the hemibrains will be deposited in containers for use in neurology" or "the parathyroids are seldom found in the dissecting room" or "these two specimens must be presented to the instructor before a final grade can be obtained" indicates either the poor quality of the writing or negligence in proof reading.

Even all this could be excused if the book would recommend itself by clarity, correctness and an understanding selection of the important facts. But this cannot be said of Hill's *Anatomy of the Head and Neck*. It is impossible to quote all the errors of the text and all the confusing and misleading passages. A few examples must suffice.

What is the student supposed to visualize as the *roof of a foramen*, especially if he reads on pages 19 and 24 that the internal carotid artery enters the skull through the roof of the foramen lacerum and then is told on pages 42, 83 and 87 that the roof of the same foramen is cartilaginous? What can these sentences mean: "The fibers which enter the sphenopalatine ganglion from the maxillary nerve continue through the ganglion without physiology" (p. 70). "The articular surface of each bone involved in the (temporomandibular) joint is covered with articular cartilage" (p. 105).

The chapters on "Some Lesions and Syndromes" and "Infection Routes of the Oral Cavity and Related Areas" betray the obvious fact that the writer has but secondhand knowledge of oral surgery and neurology. The final chapter of the "Temporomandibular Articulation and Masticatory Muscles" paints an entirely erroneous picture of this immensely important phase of functional anatomy.

The book is illustrated by thirty figures, of which ten are originals, drawn by two of the author's students whom he points out "with pardonable pride." Only the wish not to humiliate the innocent artists prevents the reviewer from analyzing their efforts.

It may seem out of proportion to devote time and effort to the criticism of a small textbook, especially if the thankless task is directed against a fellow teacher and therefore the odium of professional jealousy is so easily incurred. Despite these arguments your reviewer feels it his duty to state frankly his opinion and, in a way, to attempt to cure the spreading disease of precocious publishing. — *H. Sicher.*

Applied Orthodontics. By James D. McCoy, M.S., D.D.S., associate clinical professor of surgery (oral), School of Medicine, University of Southern California, Los Angeles; formerly professor of orthodontics in the College of Dentistry, University of California, Los Angeles. Sixth edition, thoroughly revised. 335 pages, illustrated with 227 engravings and 4 plates. Philadelphia: Lea & Febiger, 1946.

The author stresses orthodontics as a biologic problem and points out that, as such, the subject should not be concerned primarily with various mechanical methods of moving teeth. The work brings out the necessity for a broad basis for diagnosis of anomalies affecting the oral ensemble. With this point clearly brought out by the author, it is evident that oral diagnosis in itself is not sufficient for a true appraisal of the character of dento-

facial anomalies. Consideration of all of the "conjoining" parts involved in such anomalies is a necessity in intelligent and successful treatment planning. Failures in treatment attest to this fact.

The author emphasizes the importance of adequate records and case histories and the value of intra-oral and extra-oral roentgenograms and facial photographs. His fundamental philosophy of treatment for the correction of dental and oral anomalies is clearly set forth in those chapters devoted to this subject. His own methods are explained in detail, and the same lack of ambiguity and redundancy of description is evident in these chapters as elsewhere throughout the text.

The illustrations are excellent and are principally derived from the author's own extensive records, thereby conferring on this work a rare distinction of authenticity found only in a personal contribution. The consistent terminology employed and the compatibility of text to illustrations are outstanding characteristics of McCoy's writings.

In this, the sixth edition of his work, the author has laudably maintained his original purpose of providing an introductory textbook. The book not only fulfills its purpose but definitely stimulates its readers to deeper interest in, and further study of, the fascinating field of orthodontics. It is recommended not only to student and practitioner but also to anyone interested in the subject.—*Bernard G. De Vries.*

The Dentist's Own Business. By Arthur A. Campbell, D.D.S. 113 pages. Illustrated. Price $3.50. Philadelphia and Toronto: The Blakiston Co., 1946.

This book is based on the accepted premise that "sound business practices are essential to a dentist's success." The author places emphasis on records, the rotating appointment book, daily appointment cards, patients' records, examination and estimate, payment arrangements, statements, collections, credits, banking and investments.

One section of the book is devoted to the dentist, and the other section is devoted to the assistant. Both provide much valuable material for the man who is trying to improve his status in the dental profession.

There will be some who will question the continuity and the organization of the material, but this criticism will be overshadowed by the large amount of helpful material which will reward the careful reader.

The economic philosophy of the author, interspersed throughout the various chapters, is sound, and the profession will be grateful for the stimulation which the book provides.—*Charles H. Kendall.*

Voluntary Health Insurance vs. Compulsory Sickness Insurance. 124 pages. Paper. Chicago: Council on Medical Service, American Medical Association, 1946.

The medical profession's opposition to compulsory health insurance is explained from a number of viewpoints in this collection of twenty-three articles from a variety of sources.

Information is presented on medical care costs, on the experience with sickness insurance in foreign countries and on the content of health insurance laws. This information, together with the opinions of prominent physicians on the probable results of compulsory sickness insurance, presents convincing evidence that the medical profession and the public do not want a national sickness insurance system as proposed in the Wagner-Murray-Dingell bill.—*Allen O. Gruebbel.*

Physicians' and Dentists' Assistants: The Outlook for Women in Occupations in the Medical and Other Health Services. Bulletin 203, Number 11, United States Department of Labor, Women's Bureau. 15 pages. Price 10 cents. Washington, D. C.: Government Printing Office, 1945.

This pamphlet is one from a series prepared by the Women's Bureau to present the postwar outlook for women in specific occupational fields with reference to the prewar picture. Later, an over-all pamphlet will coordinate those of this series and discuss the general trends. This publication includes data relative to the prewar number and distribution of assistants; the wartime changes; the earnings, hours and possibilities for advancement, and a discussion of the postwar outlook. Some illustrations are given, and the bibliography is particularly valuable.—*Shailer Peterson.*

CURRENT LITERATURE

Growth and Transformation of the Mandibular Joint in the Rat. I. Normal Female Rat. Daniel A. Collins, Miriam E. Simpson and Herbert M. Evans. Am. J. Orthodont. & Oral Surg. 32:431, August 1946.

Sixty-nine normal female rats were studied, and, over a period of four to four hundred and sixty-five days, the rats were sacrificed to observe the changes with age in the right mandibular joint. The joints were roentgenographed, decalcified, sectioned and stained with hematoxylin and eosin. The growth changes and the formation of the normal mandibular joint are described. After five days the condyle is purely hyaline cartilage. After twenty-five days four zones of differentiation are apparent: (1) the zone of embryonic cells, (2) the intermediate zone, (3) the zone of vacuolated cells and (4) the zone of erosion. In older animals the latter three zones are calcified, but the embryonic zone remains unchanged.—*R. W. B.*

Growth and Transformation of the Mandibular Joint in the Rat. II. Hypophysectomized Female Rats. Daniel A. Collins, Hermann Becks, Miriam E. Simpson and Herbert M. Evans. Am. J. Orthodont. & Oral Surg. 32:443, August 1946.

Seventy-nine female rats were hypophysectomized at 23 to 30 days of age and were sacrificed four to six hundred and forty-five days thereafter. In four days the mandibular fossa shows changes similar to those of aging animals. In eighteen days the tissues are comparable to those of a 106 day old normal rat. By the twenty-eighth day the ossification of the mandible is as advanced as in the 258 day old normal rat. As in the normal rat, some uncalcified cartilage remains in the condyle for long periods.—*R. W. B.*

Growth and Transformation of the Mandibular Joint in the Rat. III. The Effect of Growth Hormone and Thyroxin Injections in Hypophysectomized Female Rats. Hermann Becks, Daniel A. Collins, Miriam E. Simpson and Herbert M. Evans. Am. J. Orthodont. & Oral Surg. 32:447, August 1946.

Twenty-seven hypophysectomized rats were inoculated with growth hormones and thyroxin, and 10 were reserved as controls. In those rats to which the pituitary growth hormone was administered, the appearance of early aging disappeared and normal growth was restored. When thyroxin was injected there was no apparent stimulation of growth of the mandibular joint, and when it was given in conjunction with the growth hormone, thyroxin inhibited the response. Thyroxin did, however, augment the rate of osteogenesis in the tibias of these animals, indicating differences in reactions to hormonal control of osteogenesis of these two regions.—*R. W. B.*

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Caries of the Enamel. James Nuckolls and Harry E. Frisbie. J. Am. Col. Den. 13:84, June 1946.

The authors review the historical background of dental caries, the fundamental pathology of the caries lesion and the factors which may exert an influence on the control of dental caries. The history concludes with the concepts of Miller as amplified by the Michigan research group, in which the essential decalcification of the tooth by acids of carbohydrate fermentation is emphasized, and the concept of Bodecker and Gottlieb, in which lysis of enamel proteins is stressed.

The authors believe that the demonstration of a continuous organic structure in the enamel challenges the acid erosion theories. They believe that enamel caries is primarily a degradation of the organic matrix by microbic enzymes and that decalcification of the inorganic rod takes place subsequently to proteolytic action.

In discussing the effects of fluorine in the control of caries, they express the belief that fluorine operates as a restrainer of enzyme activity connected with the disease. The authors have little hope for the successful control of caries by additions of fluorine to the drinking water or by topical application of sodium fluoride to the teeth.

The article is a challenge to the acid fermentation theory of dental caries and a support to the concept of proteolysis as the initial causative agent, but little experimental or scientific evidence is offered in support of the views expressed.—*R. W. B.*

LIST OF DENTAL OFFICERS

SEPARATED FROM ARMY DENTAL CORPS

THE following list of dental officers separated from the Army Dental Corps does not include rank because such information is no longer furnished by the Surgeon General's Office. Publication will be given to other names as soon as possible.

California	
Glendale	Wilson, Verne H.
Hanford	Kelley, Reginald F.
Hollywood	Soderberg, Vinson A.
La Jolla	Tully, Pierce E.
Los Angeles	Katz, Meyers B.
Oakland	Young, Wallace W.
Oxnard	Wasserman, Herbert A.
San Francisco	Williams, Harold J.
Santa Monica	Wittorf, Sydney H.
Whittier	Wekall, Oliver C.
Colorado	
Pueblo	Seelye, Stuart E.
Connecticut	
Bridgeport	Galla, William E.
Bridgeport	Katz, Gabriel G.
Greenwich	Wanamaker, Emmett
District of Columbia	
Washington	Spigel, Benjamin
Florida	
Miami	Kendrick, Herbert I.
St. Petersburg	Kehler, Bernard C.
Georgia	
Atlanta	Canfield, Earl R.
Blackshear	Cauthen, George M.
Camilla	Stevenson, Clyde A.
Newnan	Fuller, William B.
Idaho	
Montpelier	King, Ralph M.
Illinois	
Brookfield	Safarik, Bohumil
Chicago	Gabler, Isadore
Chicago	Galias, Benjamin J.
Chicago	Gans, Louis H.
Chicago	Kitchen, James A.
Chicago	Secter, Irving I.
Chicago	Thompson, William J.
Chicago	Zipprich, Walter F.
Edwardsville	Wayne, Marshall F.
Harrisburg	Medlin, M. Dee
Indiana	
Booneville	Raibley, Walter J.
Indianapolis	Truax, William H.
La Porte	Wagner, Gerald N.
Iowa	
Council Bluffs	Tedesco, Frank E.
Council Bluffs	Wilson, Frank E.
Panora	Ummel, Clinton L.
Red Oak	Thompson, George W.
Kansas	
Bushton	Kerr, Donald E.
Great Bend	Spece, Julius H.
Pittsburg	Killough, Howard P.
Wellington	Voshell, Milo M.
Kentucky	
Louisville	Tate, Robert N.
Mayfield	Richardson, Frank O.
Morehead	Blair, Harold F.
Vanceburg	Queen, George R., Jr.
Louisiana	
New Orleans	Gamard, Edward A., Jr.
New Orleans	Zimmerman, Hyman S.
Washington	Woodruff, Fred M.
Maine	
Auburn	Raymond, Bertrand W.
Portland	Stowell, Norman R.
Waterville	Kierstead, William F.
Maryland	
Baltimore	Garland, Stanley I.
Massachusetts	
Brookline	Figler, Samuel
Mattapan	Raskin, Melvin N.
Peabody	Gaieski, Anthony P.
Revere	Zolla, Vito A.
Michigan	
Berkley	Richards, Lloyd F.
Detroit	Glossman, Samuel
Flint	Weaver, Wrex A., Jr.
Gladstone	Kelly, George E.
Grand Rapids	Smith, Eli A.
Niles	Morton, Dean A.
Minnesota	
Bovey	Chopp, William R.
Breckenridge	Zimmermann, Kenneth A.
Duluth	Kent, Arthur A.
Gaylord	Wallin, Milo C.
Glenwood	Gandrud, Rudolph V.
Minneapolis	Gearty, Thomas D.
Minneapolis	Swenson, Harold V.

Montgomery	Richter, Lloyd E.
	Mississippi
Gulfport	Aubert, Robert L., Jr.
	Missouri
St. Louis	Kieffer, Garrett S.
St. Louis	Kitchell, Ralph J.
St. Louis	O'Keeffe, Hugh E., Jr.
	Montana
Great Falls	Westler, George D.
	Nebraska
Beatrice	Hall, Willard D.
Fairbury	Rybolt, Roy H.
Lincoln	Rockwell, Courtney P.
Omaha	Faier, Abraham D.
Omaha	Miller, Frederick J.
	New Hampshire
Manchester	Kalil, Frederick H.
	New Mexico
Artesia	Clarke, John J., Jr.
Artesia	Clarke, Laurence R.
Roswell	Eiffert, Cecil M.
	New York
Altamont	Barbagelott, Robert J.
Astoria	Ganetis, Thomas A.
Babylon	Perricone, John
Bronx	Binder, Samuel
Bronx	Bofshever, Abraham A.
Bronx	Goldstein, Mitchell
Bronx	Klein, Joseph
Bronx	Mufson, Abraham I.
Bronx	Skolnick, Louis
Brooklyn	Abramson, Abraham E.
Brooklyn	Arida, William R.
Brooklyn	Bailenson, Louis
Brooklyn	Berk, Joseph
Brooklyn	Berkeley, Joseph L.
Brooklyn	Bloom, Charles J.
Brooklyn	Blum, Murray
Brooklyn	Boccio, Joseph O.
Brooklyn	Brzustowicz, Stanislaw H.
Brooklyn	Dick, Jacob M.
Brooklyn	Feinstein, Eugene
Brooklyn	Feintuch, Jack
Brooklyn	Ferber, Jerome R.
Brooklyn	Fisher, Robert L.
Brooklyn	Fleiss, Sidney D.
Brooklyn	Frey, David
Brooklyn	Friedman, Irving
Brooklyn	Geshwind, Max
Brooklyn	Goldfarb, Charles W.
Brooklyn	Guilder, Arthur S.
Brooklyn	Halper, Norman A.
Brooklyn	Hamerschlag, Nathan
Brooklyn	Harrow, Jack H.
Brooklyn	Herman, Reuben
Brooklyn	Horowitz, Irving
Brooklyn	Israel, Walter L.
Brooklyn	Kaufman, Edward G.
Brooklyn	Kessler, Edwin J.
Brooklyn	Klein, Morton
Brooklyn	Lifton, Benjamin J.
Brooklyn	Lubitz, Jesse S.
Brooklyn	Malkin, Abraham
Brooklyn	Moskowitz, Max
Brooklyn	Musikant, Harry
Brooklyn	Nadler, Joseph A.
Brooklyn	Nahoum, Henry I.
Brooklyn	Okun, Irwin L.
Brooklyn	Phillips, Irving
Brooklyn	Poler, Irving
Brooklyn	Pollack, Burton R.
Brooklyn	Polonsky, Arnold
Brooklyn	Reitman, Albert A.
Brooklyn	Roche, Paul J.
Brooklyn	Rockwitt, Morton C.
Brooklyn	Rosenzweig, Sydney
Brooklyn	Sachartof, Julius
Brooklyn	Stern, Saul I.
Brooklyn	Stile, Vincent
Brooklyn	Wiener, Sydney P.
Buffalo	Abrams, Robert C.
Buffalo	Benzow, Glenn A.
Buffalo	Lange, Conrad S.
Buffalo	Pellien, Earl W.
Buffalo	Terry, Irvin L.
Chittenango	Cohen, Philip
Cohoes	Falcone, Anthony J.
Flushing	Falkenburg, Ernest E.
Flushing	Falkenburg, William M.
Flushing	Piper, Albert O.
Forest Hills	Abend, Gerson G.
Great Neck	November, Nathan
Hamburg	Abbott, Alan H.
Hempstead	Battey, Theodore S.
Jackson Heights	Bass, Michael J.
Jamaica	Nachlin, Jacob J.
Jamestown	Bixby, Daniel W.
Jamestown	Wolinsky, Irving R.
Long Beach	Fellman, Sidney D.
Long Island	Babinski, Lewis A.
Mamaroneck	Goldman, Theodore F.
Merrick	Beetham, Curtis M.
Mt. Vernon	Rothenberg, Alfred
Newburgh	Friedman, Michael
Newburgh	Loth, Abraham M.
New York	Ambrose, Julian
New York	Baker, Armin M.
New York	Barnett, Morton L.
New York	Blankstein, Alan H.
New York	Blumenson, Seymour
New York	Collura, Paul J.
New York	Cooper, Nathaniel
New York	Farer, Mervyn
New York	Feigelman, Samuel
New York	Feinberg, Seymour D.
New York	Ferber, William I.
New York	Flashner, Jesse
New York	Franzonello, Anthony
New York	Glassman, Paul E.
New York	Goldfarb, Robert G.
New York	Gottdank, Milton
New York	Hirsh, Harold D.
New York	Kantor, Harold
New York	Kasdan, Irving S.
New York	Klotz, Herman
New York	Laub, Leonard
New York	Lorber, Jerome W.
New York	Paul, Bernard W.
New York	Peltz, Jerome

New York	Plotnick, Samuel
New York	Reiffel, Martin L.
New York	Rittman, David
New York	Robb, James E.
New York	Saginor, Ralph
New York	Sarno, Alphonse A.
New York	Scarvalone, Edward J.
New York	Simkin, Joseph R.
New York	Stillwell, Walter B., Jr.
New York	Zane, Jerome A.
North Valley Stream	Freeman, Herbert B.
Oceanside	Geiger, Erwin S.
Oneonta	Soloweigh, Lloyd D.
Ozone Park	Rifkin, Meyer
Port Chester	Feiner, David
Richmond Hill	Kogel, George D.
Rochester	Ackert, Harold V.
Rochester	Marconi, Amerigo E.
Rockville Centre	Holland, Irving W.
Schenectady	Fleminberg, Jonas
Schenectady	Paul, Nathan
Spring Valley	Gibel, Charles
Syracuse	Currier, Richard J.
Syracuse	Lynch, George D., Jr.
Troy	Amazon, Jacob
Valhalla	DeCarlo, Salvatore A.
Woodridge	Finkelstein, Samuel
Yonkers	Jarvis, Embree F.
Yonkers	Soraci, Frank N.

North Carolina

Hebbsville	Blanchard, Manfred T.
Kinston	Dupree, Lewis J.
Oriental	Daniels, Oscar C.
Smithfield	Noble, Richard J.
Spruce Pine	McCall, Howard W.
Swannanoa	Faucette, John W.
Willow Springs	Lee, William G.
Wilson	Anderson, George N.
Winston-Salem	Byerly, Robert T.

North Dakota

Binford	Helland, Walter A.
Bismarck	Dahl, Herman C.
Bismarck	Erickson, Mayo H.
Fargo	Farrar, Fred J.
Harvey	Faul, Otto L.
Mandan	Riedinger, Ralph C.
Rugby	Hornstein, Roy R.

Ohio

Canton	Evans, Stanley T.
Cleveland	Bieber, Harry E.
Cleveland	Burns, Charles N., Jr.
Cleveland	Curti, Carl P.
Cleveland	Dankoff, Maurice H.
Cleveland	Feldman, Filmore A.
Cleveland	Stadtler, Oscar
Columbus	Barsan, Emil O.
Columbus	Friedman, Max J.
Mt. Gilead	Lanker, Wesley G.
Toledo	Davis, Glen A.
Van Wert	Frey, Robert H.
Youngstown	Carr, Robert V. C.

Panama Canal Zone

Balboa	Ferguson, Leo S.
Balboa	Thomas, Bernard W.

Pennsylvania

Aliquippa	Marcus, Allen M.
Allison Park	Arture, William J.
Apollo	Sheplar, Jack H.
Bellefonte	Evey, Sheldon W.
Bryn Mawr	Heiligman, Raymond H.
Butler	Hurwitz, Alexander
Chester	Collman, Howard C.
Coaldale	Julo, George A.
Conshohocken	Sullivan, James J.
Elizabethtown	Parrett, Jay R.
Ellwood City	Dimeo, Eugene L.
Ephrata	Schindehutte, George W.
Erie	Drake, Francis A.
Harrisburg	Dennis, Thomas G.
Harrisburg	Walker, William L.
Harrisburg	Yoffe, Samuel H.
Jeannette	Greenberg, Matthew
Lancaster	Doland, Charles K.
Lancaster	Manoff, Bernard
Lehighton	Frendt, Harold T.
McKeesport	Cook, Edwin R.
Minersville	Koehler, Robert R.
Nescopeck	Bull, Charles C.
New Castle	Goldman, Robert S.
Philadelphia	Abrams, Albert
Philadelphia	Beckerman, Fred
Philadelphia	Beckerman, Louis
Philadelphia	Benditt, Joseph
Philadelphia	Bentman, Julius J.
Philadelphia	Berlin, Harry
Philadelphia	Bernstein, Joseph E.
Philadelphia	Bieler, Warren
Philadelphia	Brand, Robert
Philadelphia	Cancelli, Anthony A.
Philadelphia	Casciato, Alfred A.
Philadelphia	Clauson, Victor
Philadelphia	Cuyjet, Aloysius B.
Philadelphia	Dessen, Benjamin B.
Philadelphia	DiMuzio, Henry R.
Philadelphia	Evans, Bernard
Philadelphia	Finley, James L.
Philadelphia	Fishmann, Marvin L.
Philadelphia	Galblum, Harry S.
Philadelphia	Helicher, Bernard
Philadelphia	Katz, Albert
Philadelphia	Leifer, Raymond N.
Philadelphia	Meyerowitz, Hyman
Philadelphia	Perri, Anthony J.
Philadelphia	Pollack, Martin W.
Philadelphia	Schwartz, William
Philadelphia	Shor, Joseph H.
Philadelphia	Spector, Irving
Philadelphia	Wolpert, Isadore
Pittsburgh	Antonucci, Philip E.
Pittsburgh	Callahan, Richard J.
Pittsburgh	Cuden, Charles L.
Pittsburgh	Monaco, Salvatore L.
Pittsburgh	Saperstein, Oscar M.
Pittsburgh	Schechter, Murray P.
Pittsburgh	Sobel, Herbert D.
Pittsburgh	Szolis, Joseph P.
Pittsburgh	Walters, Roy W.
Plains	Falcheck, Joseph S.
Pottstown	Estreicher, Nathan
Saltsburg	Shuster, Charles R.

Scranton	Butler, Robert M.
Scranton	Quinn, John A.
Sharon	Sheppard, Milton N.
Tarentum	Beattie, Thomas P.
Tarentum	Weissburg, Robert A.
Tyrone	Lake, Samuel L.
Wesleyville	Cross, Gerald P.
Wilkes-Barre	Seniuk, Michael
Wilkinsburg	Crumpton, Robert I.
York	Brothers, Erwin L.
York	Downing, Richard W.

Puerto Rico

Aguadilla	DeCardona, Jorge H.
Fajardo	Ramirez, Felix A.
Ponce	Pou, Cayetano
Santurce	Cabrera, Fernando R.
Santurce	Escalona-Robert, Rafael
Santurce	Martinez, Antonio M.
Santurce	Toro, Alberto M.

Rhode Island

Providence	Fico, Joseph M.
Providence	Quinn, Raymond J.
Rumford	Eighme, Maurice E.
Woonsocket	Berard, Celse A.
Woonsocket	Berard, Jean C.

South Carolina

Charleston	Duke, Henry M., Jr.
Fountain Inn	Fulmer, James A., Jr.
Greenville	Owings, James R.
Lancaster	Bethea, Tristram W.

South Dakota

Brookings	Atkinson, Stanley C.
Montrose	Kappenman, Stephen J.
Redfield	Clinite, Floyd E.

Tennessee

Jackson	Smith, Jack E.
Knoxville	Duggins, Joseph H.
Lebanon	Beasley, Hazle P.
Memphis	Baker, Harold H.
Memphis	Cohen, Harold
Philadelphia	Lockett, William L.
Spring Hill	Woodard, James E.

Texas

Abilene	Gambill, Raymond C.
Burnet	Paschall, Sam H.
Clarksville	Crosthwaite, George E.
Corpus Christi	Coward, Byron N.
Dallas	Cunningham, Wm. E., Jr.
Dallas	Flowers, Perry J.
Dallas	Franklin, Al C.
Dallas	French, Clarence T.
Dallas	Sanders, Homer B.
Del Rio	Gordon, George D.
Ft. Worth	Baxter, Benjamin B., Jr.
Gainesville	Davis, William H.
Gonzales	Denman, William B.
Honey Grove	Reed, Joseph Y.
Houston	Foltz, Paul A.
Houston	Ralston, Joseph W.
Houston	Schudy, Fred F.
Itasca	Ritchey, William H.
Mission	Dominguez, Hugo
O'Donnell	Farrington, Ferrell
Palestine	Murphy, William F.
Plano	Howell, James F., Jr.
San Antonio	Dickson, Richard F.
San Antonio	Parsons, William B.
Waco	Berkman, Israel E.
Waco	Cook, Joe M.
Wichita Falls	Dobbins, Thomas M.

Utah

Beaver	Bishop, William D.
Brigham City	Fishburn, Russell W.
Cedar City	Jolley, Clive B.
Hyrum	Larsen, Edgar L.
Ogden	Doxey, George R., Jr.
Ogden	Higgs, Edgar
Ogden	Wolthuis, Bartlet
Provo	Bullock, Thomas G.
Provo	Frandsen, Richard E. J.
Salt Lake City	Brooks, Richard J.
Salt Lake City	Christensen, Holley R.
Salt Lake City	McArthur, Edward D.
Salt Lake City	Meilstrup, John G.
Salt Lake City	Valentine, Boyd H.
Smithfield	Cantwell, Kenneth R.

Virginia

Buchanan	Alphin, Guy L.
Culpeper	Colvin, William R.
Fairfax	Adkerson, Morton P.
Lynchburg	Diuguid, Hubert S.
Richmond	Garian, Jack
Richmond	Page, James E.
Richmond	Robinson, Morris
Winchester	Davis, James C.

Washington

Bremerton	Chollar, Robert L.
Burlington	Finley, Floyd G.
Centralia	Breckenridge, Jack D.
Olympia	Backlund, Ronald D.
Raymond	Jensen, Harrold B.
Seattle	Louie, Kenneth S.
Seattle	Ulip, Edward J.
Spokane	Anderson, Gail C.
Spokane	Conrad, Charles H.
Tacoma	Erickson, John A.
Vancouver	Kaelin, Gordon T.

Wisconsin

Appleton	Cherry, Louis F.
Appleton	Furstenberg, Robert D.
Cudahy	Filak, John S.
Fond du Lac	Buechel, Alfred M.
Hales Corners	Mantey, Chester R.
Milwaukee	Baumann, Charles J., Jr.
Milwaukee	Cajski, Casimir S.
Milwaukee	Cerniglia, John J.
Milwaukee	DuMez, Homer
Milwaukee	Forman, Henry D.
Milwaukee	Gramza, Donald J.
Milwaukee	Hollick, Albert A.
Milwaukee	Laatsch, Harold A.
Milwaukee	Reilly, Thomas W., Jr.
Milwaukee	Rittberg, Leonard
Milwaukee	Wisniewski, Charles E.
Neenah	Donovan, John L.

Neillsville	Peterson, Ethan A.	Sheboygan	Aleff, Howard J.
Racine	Brehm, Richard E.	Spring Valley	Fast, Erwin H.
Ripon	Franey, Matthew J.	Sussex	Gissal, Eugene M.
Shawano	Wilson, Charles B.	Waukesha	Newgard, Gisle W.

LIST OF DENTAL OFFICERS

SEPARATED FROM NAVY DENTAL CORPS

THE following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

California		
Glendale	Gibbs, Wendell W.	Lieut.
Glendale	Lutz, Loren L.	Lieut.
La Jolla	Casey, Joseph A.	Lieut.
Merced	Grenfell, Wm. E.	Lt. Cmdr.
Petaluma	Bihn, John F.	Lieut.
Sacramento	Hines, John E.	Lieut.
San Francisco	Cass, Alan R.	Lieut.
San Francisco	Lavezo, Warren S.	Lieut.
Georgia		
Atlanta	Swafford, Bernard F.	Lieut.
Waycross	Lawrence, James H.	Lieut.
Illinois		
Centralia	Kraus, K. G.	Lt. Cmdr.
Chicago	Rosenfeld, Leon	Lieut.
Chicago	Sousa, Louis J.	Lieut.
Kentucky		
Bardstown	Oakley, William W.	Lieut.
Maine		
East Brownfield	Macalaster, Gordon G.	Lieut.
Minnesota		
Duluth	Korda, Lawrence L.	Lieut.
Oklahoma		
Oklahoma City	Ross, William W.	Lieut.
Oregon		
Portland	Schulz, Robert F.	Lieut.
Salem	Hill, Clifford F.	Lieut.
Pennsylvania		
Coraopolis	Gearhart, D. F.	Lt. Cmdr.
Easton	Sassaman, Robert K.	Lieut.
Philadelphia	Shields, Robert C., Jr.	Lieut.
Pittsburgh	Gale, Robert W.	Lieut.
Puerto Rico		
San Juan	Molina, Fernando A.	Lieut.
South Carolina		
Chester	Haddad, George C.	Lieut.
South Dakota		
Aberdeen	Gerber, James J.	Lieut.
Tennessee		
Newport	Siskin, Milton	Lieut.
Texas		
Coleman	Gay, Glenn D.	Lieut.
Dallas	Godbehere, J. W., Jr.	Lieut.
Utah		
Hiawatha	Kirk, William S.	Lieut.
Salt Lake City	Hardy, Frederick R.	Lieut.
Vermont		
Northfield	Caccava, Ralph M.	Lieut.
Virginia		
Richmond	Johnson, Charles W.	Lieut.
Washington		
Prosser	Pearl, William E.	Lieut.
Sedro Woolley	Mueller, Ray B.	Lieut.
West Virginia		
Beckley	Rohrer, Albert D.	Lieut.
Charleston	Kessell, Harry R.	Lieut.
Huntington	Zumbrunnen, C. E.	Lieut.
Wisconsin		
Birnamwood	Bro, Robert L.	Lieut.
Chippewa Falls	Haley, John B.	Lieut.
Kenosha	Riedel, Richard A.	Lieut.
Milwaukee	Kopp, Aloyse E.	Lieut.
Milwaukee	Minkin, Solomon	Lieut.
Milwaukee	Snoeyenbos, T. D.	Lieut.
Richland Center	Jacobs, Ascher L.	Lieut.

DEATHS

Acton, H. Lyle, Sterling, Ill.; School of Dentistry, Washington University, 1932; died February 14; aged 40.

Askew, Edgar F., Hackensack, N. J.; Meharry Dental College, Dental Department of Meharry Medical College, 1922; died January 15; aged 55.

Baker, James M., Webster Groves, Mo.; School of Dentistry, University of Louisville, 1894; died January 11; aged 73.

Baretincic, Martin F., Johnstown, Pa.; School of Dentistry, University of Pittsburgh, 1941; died January 12; aged 30.

Barnett, Arthur, Memphis, Tenn.; School of Dentistry, Vanderbilt University, 1896; died January 15; aged 75.

Bauerle, William C. T., Philadelphia; Pennsylvania College of Dental Surgery, 1905; died January 30.

Bergman, David N., Spokane, Wash.; died January 11; aged 39.

Birmingham, Joseph G., Lewistown, Pa.; School of Dentistry, Temple University, 1923; died January 18; aged 44.

Black, John C., Chicago; Keokuk Dental College, 1902; died January 28; aged 70.

Brown, Joseph M., Syracuse, N. Y.; died January 27.

Buckland, C. F., Miami, Fla.; School of Dentistry, University of Buffalo, 1898; died January 22.

Cushnie, Albert W., Honolulu, T. H.; Dental School, Northwestern University, 1936; died January 18; aged 42.

Doyle, Thomas L., Chicago; College of Dentistry, University of Illinois, 1919; died January 31; aged 50.

Endicott, S. C., Eugene, Ore.; School of Dentistry, North Pacific College of Oregon, 1905; died January 15; aged 63.

Fitzpatrick, C. E., Wellston, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1895; died January 24; aged 75.

Fraker, Guy, Champaign, Ill.; died February 2.

Gibbs, Homer E., Union City, Tenn.; died January 9; aged 39.

Grandy, Fred K., Los Angeles; Medico-Chirurgical College of Philadelphia, 1900; died January 22; aged 79.

Heywood, Humphrey B., Sr., Rome, Ga.; School of Dentistry, University of Louisville, 1898; died January 11; aged 68.

Hobbs, Lester B., Nauvoo, Ill.; Keokuk Dental College, 1902; died January 23; aged 72.

Hopfer, William G., Deshler, Nebr.; Kansas City Dental College, 1901; died January 21; aged 70.

Hunt, Manson M., St. Louis; School of Dentistry, St. Louis University, 1908; died January 11; aged 84.

Johnson, Thomas E., Rapid City, S. Dak.; School of Dentistry, Marquette University, 1905; died January 27; aged 61.

Keiser, J. H., Shamokin, Pa.; Pennsylvania College of Dental Surgery, 1899; died January 30; aged 68.

Kirkpatrick, John D., Richmond, Ind.; School of Dentistry, Indiana University, 1905; died February 6.

Knight, Woodie S., Healing Springs, Ala.; died January 19; aged 63.

Koziczynski, Lucian C., Chicago; College of Dentistry, University of Illinois, 1918; died January 16; aged 50.

Lancit, Louis A., Newark, N. J.; School of Dentistry, Temple University, 1906; died January 17; aged 66.

Leonard, Claude A., Providence, R. I.; College of Dentistry, University of Minnesota, 1897; died January 22.

McLaughlin, Hugh C., Sayre, Okla.; Dental School, Northwestern University, 1917; died in December; aged 54.

McMahon, Dennis C., Meriden, Conn.; died January 31.

McMaster, Clyde A., Wayne, Nebr.; died January 18; aged 68.

Marks, Edward A., Brooklyn; New York College of Dentistry, 1913; died January 19; aged 55.

Markwell, John W., Little Rock, Ark.; School of Dentistry, Washington University, 1891; died February 5.

Mauldin, Walker M., Memphis, Tenn.; died January 15; aged 77.

Mell, William B., Miami, Fla.; Atlanta Dental College, 1895; died January 23; aged 75.

Miller, Clarence A., Cincinnati, Ohio; died February 5; aged 60.

Miller, Elwood J., Coral Gables, Fla.; Northwestern College of Dental Surgery, 1897; died January 19.

Miller, Norman, Ardmore, Okla.; died January 9; aged 63.

Morrison, Stanley F., Erie, Pa.; died January 28.

Myers, Norman H., Wilkes-Barre, Pa.; School of Dentistry, Temple University, 1894; died February 3.

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Orthodontics: L. B. Higley, 705 S. Summit St., Iowa City, Iowa.

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ANNOUNCEMENTS

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	April 8–10	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Arizona	May 1–3	Tucson	B. K. Litt	68 E. Congress, Tucson
Arkansas	May 19–21	Little Rock	I. M. Sternberg	Merchants Bank Bldg., Ft. Smith
California	April 28–30	San Francisco	L. E. Linehan	450 Sutter St., San Francisco
S. California	Sept. 15–17	Los Angeles	R. L. Borland	903 Crenshaw Blvd., Los Angeles 6
Colorado	May 25–28	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut			E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			J. Krygier	309 S. State St., Dover
D. of Columbia	June 10	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Nov. 10–12	St. Petersburg	J. I. Todd	433 St. James Bldg., Jacksonville
Georgia			J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	October	Honolulu	J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho	June 9–11	Sun Valley	H. F. Miller	Moscow
Illinois	Oct. 9–11	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 19–21	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 6–8	Des Moines	A. N. Humiston	417 Higley Bldg., Cedar Rapids
Kansas	May 12–15	Kansas City, Mo.	F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky	March 31–April 2	Louisville	J. L. Walker	640 Barbee Way, S., Louisville
Louisiana	April 10–12	New Orleans	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 5–7	Poland Springs	A. H. Garcelon	State House, Augusta
Maryland	April 28–30	Baltimore	J. H. Shackelford	706 Baltimore Life Bldg., Baltimore 1
Massachusetts	May 5–8	Boston	P. E. Adams	106 Marlborough St., Boston
Michigan	April 14–16	Detroit	F. Wertheimer	Michigan Department of Health, Lansing
Minnesota			L. M. Cruttenden	Lowry Medical Arts Bldg., St. Paul
Mississippi	June 1–4	Biloxi	O. L. Colee	Magnolia
Missouri	May 12–15	Kansas City	C. W. Digges	Exchange National Bank Bldg., Columbia
Montana	May 1–3	Missoula	C. S. Renouard	305 Phoenix Bldg., Butte
Nebraska	May 12–14	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	May 12–13	Las Vegas	L. G. Jacob	505 Chestnut St., Reno
New Hampshire	June 15–17	Portsmouth	F. E. Williams	814 Elm St., Manchester
New Jersey	April 27–30	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 26–28	Santa Fe	J. S. Eilar	First National Bank Bldg., Albuquerque
New York	May 13–16	Buffalo	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 4–7	Pinehurst	C. W. Sanders	Benson
North Dakota	May 12–14	Grand Forks	K. G. Allen	Fargo
Ohio	Nov. 9–12	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma	April 13–16	Oklahoma City	E. W. Wise	Medical Arts Bldg., Tulsa
Oregon	June 5–7	Portland	W. H. Hurley	922 Selling Bldg., Portland 5
Panama Canal Z.			T. W. Cagle	Box 243, Cocoli
Pennsylvania	May 6–8	Philadelphia	E. R. Aston	421 Market St., Kingston
Philippine I.			G. A. Carreon	9 Broadway, Third St., N. Manila
Puerto Rico			R. Miranda	Box 747, Rio Piedras
Rhode Island			M. B. Messore	707 Union Trust Bldg., Providence
South Carolina	April 27–29	Myrtle Beach	J. R. Owings	Greenville
South Dakota	May 29–31	Black Hills	E. W. Elmen	Sioux Falls
Tennessee	May 12–15	Nashville	E. J. Justis	Exchange Bldg., Memphis
Texas	April 28–May 1	San Antonio	W. Ogle	313 Medical Arts Bldg., Dallas
Utah	June 5–7	Ogden	S. Ballinger	401 Medical Arts Bldg., Salt Lake City
Vermont	May 25–27	Woodstock	J. A. Larrow	Middlebury
Virginia	April 14–16	Roanoke	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	May 5–7	Spokane	F. J. Dingler	1502 Medical & Dental Bldg., Seattle 1
West Virginia	May 19–21	Bluefield	C. J. Gavelda	Clarksburg
Wisconsin	March 31–April 2	Milwaukee	K. F. Crane	1233 Bankers Bldg., Milwaukee 2
Wyoming	June 19–21	Casper	J. D. McNiff	208 Grand Ave., Laramie

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 23–27	Birmingham	M. W. Gaillard	Merchants Bank Bldg., Mobile
Arizona	June 25–28	Phoenix	R. K. Trueblood	25 North Second Ave., Glendale
Arkansas	June 23	Little Rock	H. E. Hanna	National Bank of Commerce Bldg., El Dorado
California	June 16	Los Angeles	K. I. Nesbitt	515 Van Ness Ave., San Francisco 2
Colorado	June 15–19	Denver	E. G. Netherton	724 Republic Bldg., Denver 2
Connecticut	June 17–21	Hartford	C. G. Brooks	New London
D. of Columbia	June 9	Washington	H. A. Swanson	1726 Eye St., N.W., Washington
Florida	June 30–July 3	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Indiana	June 16–19	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Kansas	June 2–5	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Michigan	June 16	Detroit	J. L. Champagne	502 David Whitney Bldg., Detroit 26
Minnesota	June 16–21	Minneapolis	E. E. Comartin	336-100 First Avenue Bldg., Rochester
Mississippi	June 17–19	Jackson	W. R. Madden	Forest
Nebraska	June 9–12	Omaha	C. A. Bumstead	924 Stuart Bldg., Lincoln
New Jersey	June 9–13		W. A. Wilson	150 E. State St., Trenton 8
New Mexico	April 2–5	Santa Fe	J. J. Clarke	Artesia
North Carolina	June 23	Raleigh	F. O. Alford	Charlotte
North Dakota	July 6–11	Fargo	W. J. Ford	Fargo
Ohio	June 16–21*	Cleveland	E. D. Lowry	79 E. State St., Columbus
Pennsylvania	June 23–28†	Philadelphia and Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
South Carolina	July 7	Columbia	E. G. Bumgardner	1517 Hampton St., Columbia 29
Tennessee	June 9–13	Memphis	J. J. Vaughn	1001 Medical Arts Bldg., Nashville
Texas	May 4–9	Houston	C. C. Hardin, Jr.	311 Capitol National Bank Bldg., Austin
Vermont	June 23–25	Montpelier	C. I. Taggart	139 Bank St., Burlington
West Virginia	June 23–26	West Liberty	R. H. Davis	515 Goff Bldg., Clarksburg

*Practical, June 16–18 (dental); June 17 (hygienists). Theory, June 19–21.

†Written, June 23–25 (dental); June 24–25 (hygienists). Clinical, June 26–28 (dental); June 26 (hygienists).

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
American Academy of Dental Medicine, First Annual Meeting	June 15	New York	S. Sorrin Program Chm.	745 Fifth Ave., New York 22
American Association of Dental Schools	June 23–25	Chicago	J. E. Buhler Secy.	School of Dentistry, Temple University, Philadelphia 30
American Association of Industrial Dentists	April 30–May 1	Buffalo	L. D. Heacock Secy.	Industrial Hygiene Division, National Institute of Health, Washington 14, D. C.
American Association of Orthodontists, Central Section	April 14–15	Minneapolis	C. R. Baker Chm.	636 Church St., Evanston, Ill.
American Board of Oral Surgery	July 29–30*	Boston	L. M. FitzGerald Secy.	718 Roshek Bldg., Dubuque, Iowa
American Dental Association	Aug. 4–8	Boston	H. Hillenbrand Secy.	222 E. Superior St., Chicago
American Dental Hygienists' Association	Aug. 4–8	Boston	A. R. Fisk Secy.	1704 N. Troy St., Arlington, Va.
American Dental Society of Europe	August 1948	London	K. C. Campbell Secy.	88 Portland Place, London, W. 1.
American Society of Oral Surgeons, Twenty-Ninth Annual Meeting	July 30–Aug. 2	Boston	H. Bear Secy.	1112 E. Clay St., Richmond 19, Va.
National Board of Dental Examiners	April 21–22†		G. L. Teall Secy.	Box 71, Hiawatha, Kan.
National Council on Rehabilitation	April 29–30	St. Louis	C. S. Truax Ex. Secy.	1790 Broadway, New York 19
Southern Society of Orthodontists	April 21–22	Mobile, Ala.	L. T. Daniel Secy.	407 American Bldg., Orlando, Fla.
Ontario Dental Association, Eightieth Meeting	May 19–21	Toronto	H. R. Skilling Publicity Chm.	86 Bloor St., West, Toronto 5, Ont., Canada

*Examinations for certification.

†Examinations will be held in schools where there are five or more candidates.

Northwest Conference in Dental Medicine	May 18–21	Harrison Hot Springs, B. C.	C. R. Hallman Secy.	4298 Dunbar St., Vancouver, B. C., Canada
Illinois Public Health Association	April 18	Springfield	W. H. Tucker Program Chm.	1806 Maple St., Evanston, Ill.
Academy of Denture Prosthetics	July 28–Aug. 3	Boston	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
Cleveland Dental Society, Annual Spring Clinic Meeting	May 5–7	Cleveland	W. J. Benson Publicity Chm.	Keith Bldg., Cleveland
Medical Library Association, Forty-Sixth Annual Meeting	May 27–29	Cleveland	Ada L. Floyd Chm.	Cleveland Medical Library Association, 11000 Euclid Ave., Cleveland 6

INTERNSHIPS, EXTERNSHIPS, RESIDENCIES AND FELLOWSHIPS

The Children's and Infants' Hospital (a Unit) of Boston. Address Paul K. Losch, 300 Longwood Ave., Boston.

The Children's Memorial Hospital, Chicago. Administrator, Mabel W. Binner, 707 Fullerton Ave., Chicago.

Columbia University, School of Dental and Oral Surgery. Associate Dean, Bion R. East, 630 W. 168th St., New York 32.

Eastman Dental Dispensary, Rochester, N. Y.

Fellowships for Research and Graduate Work in the Dental Sciences, University of Rochester. Dean, George H. Whipple.

The Forsyth Dental Infirmary for Children. Director, Percy R. Howe, 140 The Fenway, Boston.

International Grenfell Association. Staff Selection Committee, 156 Fifth Ave., New York.

Jewish Sanitarium and Hospital for Chronic Diseases. Director, Leonard Kohn, Dental Division, E. Forty-Ninth St. and Rutland Road, Brooklyn 3, N. Y.

Joseph Samuels Dental Clinic of the Rhode Island Hospital, Providence. Director, Ernest A. Charbonnel.

Notre Dame Bay Memorial Hospital, Twillingate, Newfoundland. Address John M. Konopka, 25 W. Independence St. Shamokin, Pa.

Richmond Freeman Memorial Clinic for Infants and Children, Dallas, Texas. Executive Director, Dora B. Foster, 3617 Maple Ave., Dallas.

University of Illinois, Graduate School. Secretary, Committee on Graduate Work in Medicine, Dentistry and Pharmacy, 1853 W. Polk St., Chicago 12.

University of Illinois, College of Dentistry. Isaac Schour, College of Dentistry, University of Illinois, 808 S. Wood St. Chicago 12.

University of Oregon, Medical School, Portland. Administrator, Charles N. Holman, 3181 S. W. Marquam Hill Road, Portland.

Walter G. Zoller Memorial Dental Clinic, University of Chicago. Director, J. R. Blayney, 950 E. Fifty-Ninth St., Chicago 37

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